The Story of Foods

Forrest Crissey

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THE STORY OF FOODS

By

FORREST CRISSEY

with an introduction by DOUGLAS C. RIDGLEY, *Professor of Geography, Illinois State Normal University*

RAND McNALLY & COMPANY

Chicago *New York*

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ACKNOWLEDGMENTS

Thanks are due to the *Saturday Evening Post* for permission to use portions of certain copyrighted articles originally published in that journal.

The author is especially indebted to the various bureaus and offices of the United States Department of Agriculture and the United States Department of Commerce for coöperation in furnishing both data and critical assistance. In the United States Department of Agriculture he is under particular obligation to Leon M. Estabrook, Nat C. Murray, and George K. Holmes, of the Bureau of Crop Estimates, to Dr. M. E. Pennington, Chief of the Food Research Laboratories and to Dr. O. E. Baker, Agriculturist. Much invaluable assistance has been given by Dr. E. E. Pratt, Chief of the Bureau of Foreign and Domestic Commerce, and Dr. Hugh M. Smith, Commissioner of Fisheries. George F. Mitchell, Supervising Tea Expert of the United States Treasury Department, has placed the author under great obligations by his unstinted coöperation.

From William Harper Dean, of *The Country Gentleman*, Dr. Mary E. Pennington, Norris H. Reed, B. W. Snow, W. F. French, Harry Snowden Stabler, and Adolph Kruhm has come assistance in kind and quantity amounting to collaboration.

The authorities which the author has consulted, with especial benefit, are the *Grocers' Encyclopedia*, edited by Artemas Ward, and *The Story of Wheat* by William C. Edgar.

To name all those actively connected with the commerce of foods to whom the author is indebted for information is impossible.

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THE INTRODUCTION

The Story of Foods, whose author has for many years written on industrial, commercial, and agricultural topics for the millions of readers of the *Saturday Evening Post*, is a vivid presentation of a subject of daily interest to every pupil and teacher in school, as well as to every other member of the household and the community.

This graphic story deals especially with the human agencies concerned in the production, preparation, and distribution of foods. It tells many things concerning our ordinary foods about which we have often wondered. We are given a glimpse into the large business enterprises engaged in making it possible for our grocer to furnish us with a wonderful variety of foods gathered from all parts of the world.

The Story of Foods will be of distinct service to two groups of pupils: geography classes and domestic science classes. It will supplement the textbook at many places throughout the entire course in geography in the elementary school. It will supply domestic science classes with abundant information on the methods of handling foods as a commercial undertaking, as well as on their production, and thus give a comprehensive world view of foods and their geographical and industrial background.

Mr. Crissey's book has an important function to perform in the school, but it also deserves a place as a working handbook in the home, for it holds a rich fund of practical information, interesting and instructive to all who would understand how the daily table of the family of moderate means affords to-day a greater variety of foods than did the tables of kings and princes of centuries past.

DOUGLAS C. RIDGLEY

Illinois State Normal University
Normal, Illinois

Courtesy of Restaurant Royale

This "International Salad," served in a bowl sculptured from crystal ice, by Carl Schmidt, contained ingredients which came from eleven countries and seven states, as follows:

Heart of palm....Africa	Pepper .....Ceylon	Cucumbers.....Indiana	Salt .....Kansas
Endive.....Belgium	Romain .....Louisiana	Pimientos.....Spain	Lettuce.....Florida
Olive oil .....California	Garlic.... .....Italy	Pearl onions .....Germany	Tomato .....New Jersey
Roquefort cheese...France	Radishes .....Illinois	Paprika.....Hungary	Malt vinegar....England
Mustard .....India		Chili.....Mexico	

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THE STORY OF FOODS

CHAPTER I

THE WORLD'S GREATEST NEED

"We eat to live." Food is the first demand of physical life. There are climates in which it is possible to live without clothing or shelter, but the necessity for nourishment is the same the world over. Neither man, beast, nor any other living thing can withstand this demand for more than a few days.

For this reason the most important question we can ask about any country is: What does it yield to the world's food supply? The land that gives little or no food for the support of the human race is too barren to claim the interest of an intelligent man or woman, boy or girl. The search for gold and precious stones has been shrouded in romance, but this line of exploration is of little significance when compared with that which ransacks the most remote corners of the earth for foods with which to nourish mankind more generously, wholesomely, and pleasingly.

The bill-of-fare and the map. It would be hard to suggest a more fascinating pastime than that of taking our daily bill-of-fare apart to learn where every element of it has come from, how far it has traveled, and by what strange and devious ways it has journeyed to reach our table. Apply this suggestion to every bit of food served in your home for one week and you will learn more real geography than

in a month of memorizing meaningless statements which seem wholly removed from your personal

Brown Bros.

Loading railway cars with bananas brought out from a Costa Rica plantation. The banana, the most prolific fruit plant known, is grown over a large and increasing area in Costa Rica

experience. Certainly the food you eat comes close to your daily life; and to trace to their sources the things that nourish you is to show only a reasonable degree of human curiosity.

Altogether the most interesting way in which to get a grasp of the distant background of the foods that come to your plate and of the many remote and mysterious regions of the globe which contribute to your meal, is to spread a map of the world before you. Then with a penciled line connect the spot that stands for your home and that from which hails each article of food on your table. Now, if you would realize still more vividly the pains the food merchants have taken in order to set before you an

ever-increasing variety of tempting delicacies, get another world map on which are marked the ocean pathways (see page 20) traveled by ships of commerce. Then trace on this map the trade routes over which each food element has been brought to this country.

In this connection the term "tempting delicacies" is used deliberately, because, if you follow this interesting line of inquiry, you will soon learn that no other country in the world is capable of producing so generous a supply of the real food necessities as the United States. There is scarcely a single food in all that may be mentioned which is not produced in large quantities in this country. Or, to put the situation in the simplest terms possible, scarcely any food is furnished by other countries that we could not do without. But if the food merchants should suddenly stop drawing on the distant regions of the earth for our table supplies, we would be brought to a quick and keen realization of the service they are rendering the public. For we would miss a multitude of delicious things which make our meals not only more tempting but also a great deal more wholesome.

We can never appreciate what the world-searching industry of the food merchants means to us unless we keep in mind the fact that we demand variety in our food as well as in our work and our play. Also narrow living is likely to mean unwholesome living, and the human stomach as well as the human mind abhors and rebels against monotony. Therefore, he who adds a new and agreeable food to the list from which we are able to choose our fare does us a distinct service.

The foods of yesterday. It is almost impossible to realize how narrow and limited was the range of

Brown Bros.

The twentieth-century market with its tremendous and varied supplies brings a keen realization of how extremely limited in variety were the "foods of yesterday"

diet in the days of our grandfathers and great grandfathers. But we need not go back to the pioneer days of this country to illustrate the meager variety of foods with which the average family larder was stocked. The day book of a retail grocer located in a midwestern town shows that the entire list of imported articles of food sold by him in the year 1862 was as follows: coffee, tea, figs, mustard, pepper, cloves, allspice, nutmeg, ginger, cinnamon, lemons, oranges, sago, prunes, raisins, and almonds. This day book also shows that the principal line of foods then handled by the country storekeeper would add to this list only eggs, molasses, dried apples, dried peaches, cranberries, potatoes, sugar, vinegar, saleratus, butter, cheese, crackers, lard, smoked

halibut, whitefish, dried herrings, rice, sirup, salt, cream of tartar, beans, rye coffee, peanuts, beef, veal, pork, lemon extract, onions, cabbage, turnips, and native nuts.

Possibly this storekeeper kept other foods, but if so, his charge accounts for two years give no evidence of that fact. How strange a stock of goods confined to these items would appear in contrast with the wide range of articles required by the modern retail grocery! A man living in eastern New York declares that he remembers when a pound of loaf

Courtesy of "Youth's Companion." Original by C. D. Hubbard

The pioneer storekeeper's busy day. An interior scene of a grocery store in our great grandfather's days

sugar lasted his family a year. As a schoolboy, his luncheon was "hasty pudding"—cornmeal mush—

and milk. In his boyhood on a New York state farm his family lived almost entirely upon the products of their immediate neighborhood, the principal things purchased being tea, pepper, salt, and cinnamon.

The foods of to-day. Contrast with this narrow and monotonous diet the range of delicacies now available to the American family of average means, and to the housekeeper who carefully considers her outlay for foods, while giving her family a generous variety of things good to eat. Possibly the best way to make you realize the wonderful expansion in the range of our food supply would be to repeat the statement of a large food jobber who recently said:

"The cost book of the smaller inland grocery jobber to-day contains from 5,000 to 15,000 separate and distinct items, while there are more than 40,000 items listed in the cost book of this house, which does a nation-wide business. A majority of articles in that list are brought in from foreign countries; and, measured in dollars, we do a larger volume of business in imported foodstuffs than we do in domestic goods. We are food explorers, ransacking the entire earth for the things with which to satisfy the cultivated appetite of the American consumer. The stock in the most ordinary country grocery store is brought from the four corners of the earth.

"The only way in which to get a vivid and graphic realization of the economic service which the wholesaler in this line renders to the consumer is to try to imagine what would be the food situation in this country if every grocery jobbing house were suddenly struck out of existence, together with all of their accumulations of food supplies. For all

practical purposes we should then be thrown back to the old, crude system of the earliest pioneer days,

Contrast the stock of goods carried by a storekeeper of our grandfather's days with the amazing variety found in the stock of an inland country grocer of to-day

when each community lived almost entirely on the narrow range of foods that could be produced locally. But such a situation would be wonderfully illuminating. It would reveal as nothing else could the position of the wholesaler of foodstuffs in the economic scheme of modern living. Also it would show most vividly how immense and complex is the fabric of modern food demands—a fabric woven of threads drawn from every part of the civilized and semi-civilized earth."

In view of these facts, the statement that the study of geography from the standpoint of the dining table and the food store becomes a fascinating

pastime, seems only too true. When you meet every kind of food that passes your lips with the question, "Where did it come from and what has been its history, its travels, and its demands upon the labor of mankind?" you are in a way to learn much about geography, government, and economics and to learn it with little conscious effort.

Chapter II

THE JOURNEYS OF FOODS

From producer to consumer. There is scarcely any chapter in the history of foods more fascinating than an account of their travels. Probably the most graphic way of showing you the wonders of carrying foods is to take you on a "food journey." Only a little experience in following foods from their source to the consumer is necessary to prove it an interesting game, one abounding in surprises.

From tea garden to tea table. First let us follow a shipment of tea from the tea gardens to the tea

Hauling tea to the railway station in Ceylon

table. While we are doing this, we shall see through how many hands this tea passes on its long journey.

This will also give us a good idea of the great amount of work involved in preparing a cup of tea for us.

Loading tea at the dock with the aid of a hand derrick

The Ceylon natives who pick and carry tea in large baskets to the curing stations are the first people to handle it. After the tea is cured it is put into chests or boxes and carried in oxcarts to the railway station, whence it is borne by train to Colombo. Here it is again handled by other natives and placed in a warehouse, where it remains until a foreign buyer purchases it. More than likely this buyer will be an Englishman who will first carefully test the tea.

Next it is hauled to the dock and loaded into small boats with the aid of a hand derrick. Then by means of a steam winch, it is lifted from the small boats or "lighters" and lowered into the hold of a steamship. In this stage of its journey it is

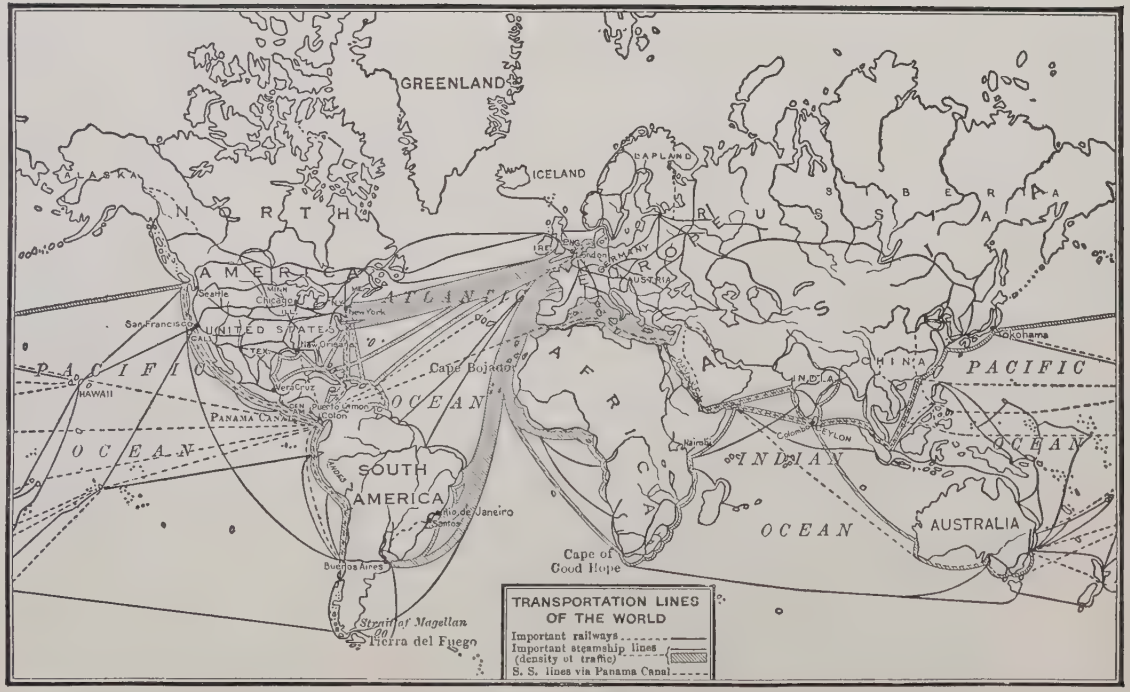
handled by sailors who have shipped under the English flag.

In all probability, this steamer is built with especial reference to the needs of the tea trade, its hold being divided into many small rooms or compartments in which the tea is stored. This arrangement reduces the breakage of chests and the damage from other causes.

The steamship now carries the tea to Liverpool, England, where it is unloaded by the sailors and English stevedores or dock laborers. The tea is next inspected by an English government inspector, then hauled by motor truck or wagon to a large warehouse, where it is again handled by English laborers.

The tea remains in this warehouse until sold. Perhaps an American importer inspects the shipment and buys a hundred chests of it. Then this special lot of Ceylon tea is again hauled by motor truck or wagon to the dock, loaded aboard a large steamer, and carried swiftly across the Atlantic Ocean. At New York, American dock workers unload it and it is transferred by a motor truck to a bonded warehouse. A bonded warehouse is a building belonging to the United States government, where merchandise subject to a federal revenue tax is kept until it is found to comply with our laws regulating its admittance, and the tax paid. After the tea has been tested by the government tea inspector, it is transferred to the building of the American importer. There an electric elevator carries it to an upper floor, where it is probably packed in small boxes or tins and labeled by American girls. It is then placed in the storerooms until sold to retailers.

A portion of the tea is sold to an out-of-town



Ocean trade routes over which ships of commerce carry the world's food supplies

customer. The shipment is sent down to the basement, loaded on tiny freight cars, and carried under

The basement shipping floor of a great American importing house

ground by an electric engine to the freight depot of the railway which is to deliver it to the country customer. There it is shifted by freight handlers into a box car of mixed merchandise. The freight train of which this car is a part is hauled by a big steam locomotive to the town to which the tea is shipped. Here it is unloaded by the train men and left in the freight depot until called for by the truck man serving the grocery store that has purchased it. This delivery man carries it in his wagon to the retail grocery store, where the grocer or one of his clerks unpacks it and places it on his shelves.

The tea has one more trip to make—a journey in the grocer's delivery wagon or motor to the home of the consumer. Of course the consumer buys

only a small quantity of tea at one time, probably a one-pound can. Let us suppose that on the afternoon when the tea is delivered, the housewife has callers and asks them to have tea with her. If she has a tea wagon there is still another ride, although a short one, for the fragrant leaves from the far Orient—a trip on the dainty tea wagon from the kitchen into the room where the guests are waiting.

So we find that, from the first journey the tea makes, in the big basket on the back of the Ceylon native, until it is served by the maid from the tea wagon, it is handled by many people and is carried in many vehicles. If you try in this way to trace from its source every food served on your table, you will soon learn what interesting travelers are the foods which come from the remote regions of the earth to your kitchen. You will also learn how large a part of the world's greatest systems of transportation is devoted to the carrying of foods.

Carrying food in the United States. The quantity of food material carried by the railroads of the United States is so vast that it staggers the imagination. In a single year more than 116,084,000 tons of foodstuffs were hauled over the railways of this country. Of this startling total more than 52,000,000 tons were grain. Of animal products almost 30,000,000 tons were transported by rail. This mighty burden may be separated into four classes: 15,000,000 tons of live stock, 2,500,000 tons of dressed meats, 2,500,000 tons of other packing-house products, and 9,000,000 tons of poultry, eggs, milk, fish, and game. In the same year our railroads carried more than 17,000,000 tons of fruits and vegetables and 9,000,000 tons of flour.

If you wish to get a better understanding of the great task of carrying food, take your pencil and

Humphries Photo Co.

Hauling cabbage to market by wagon. Garden products for near-by cities are largely carried by wagon and motor truck

reduce these tons to pounds. But you must not forget that a considerable amount of the foodstuffs used or produced in this country are not shipped by rail at all, but carried by wagon, by truck, and by boat.

Care in shipping foods. In railway and steamship advertisements we are constantly reminded of the comforts of travel provided for passengers. Few, however, realize that foods receive almost as good care as people in modern transportation. For example, many kinds of foods are shipped from the Pacific to the Atlantic coast in specially made express cars which are attached to passenger trains and run on fast-time schedules. The cost of building one of the "passenger express refrigerator" cars is officially stated to be not far from forty-five hundred

dollars. The California shipper who fills one of these cars with butter and ships it to New York or

Icing a "passenger express refrigerator" car with an automatic chain ice conveyor

Philadelphia does so at an express charge of about one thousand dollars. Butter, however, is an especially heavy food and therefore expensive to ship. The cost of shipping a car of this type filled with fruits or vegetables from the Pacific to the Atlantic usually runs from six hundred to eight hundred dollars for the trip by this fast service. Table grapes, cantaloupes, cherries, asparagus, and many vegetables are thus sent by the carload across the continent when they could not be successfully carried so long a distance under ordinary transportation conditions.

Special cars for special foods. Almost every food has peculiarities which must be carefully provided

for by those undertaking to transport it a long distance and deliver it at the end of the journey in good condition. Of many foods it may be said that if the temperature is too low they frost; if too high, they sweat. These extremes are carefully guarded against. Some fruits are more successfully carried when cooled by ventilation than by refrigeration. This is especially true of the more delicate berries.

The most important types of special food cars are those made for carrying fresh beef, cured meats, fruits and vegetables requiring ventilation, fruits and vegetables demanding refrigeration, bananas, fish and oysters, pickles, potatoes, dairy products, mineral waters, maize products, cottonseed oil, molasses, cattle, hogs and sheep, live poultry. Big

Loading refrigerator cars with fruit and vegetables from the great truck gardens of the South for the long journey to northern markets

shippers have found it profitable to develop a distinct type of car for every food named in this list.

The banana and mineral water cars are especially frost proof; the fresh-meat car has racks for hanging

Interior of a special fresh-meat car. In these cars the halves of beef are hung upon racks

halves of beef; the cars for pickles, maize products, cottonseed oil, and molasses are tank cars. In a word, each car named has some distinct feature which especially fits it for the safe transportation of some special kind of food product.

Taking care of small shipments. This work of perfecting the means of carrying foods to the highest point of efficiency does not stop with the building of special freight and express cars. Not all food shipments can be made in full car lots. This means that many devices have been invented to take care

of small shipments. For instance, there is the "pony refrigerator" for the carrying of delicate fruits in ordinary express cars. This is lined with zinc and is much like a large house refrigerator. The earliest California cherries, for example, are quite generally shipped to the Atlantic seaboard in these cars.

One of the simplest but most useful devices for the carrying of highly perishable foods in small quantities, thus far developed, is a patent box, made in many sizes, the especial feature of which is a shallow tray of cheap tin, which fits into the top of the

One of the simple devices for shipping small packages of perishable foods. The small baskets as well as the hamper are lined with green paraffin paper

box after the foodstuff has been packed. This tray has a drain spout which runs outside to carry off the

water from the ice with which the tray is filled. When the box has reached its destination the tray is thrown away.

Preparing vegetables for shipment. Spinach, from California and Texas, affords a good example of the special preparation which many foods require before being sent on a long journey. When they come in from the fields, the loads of spinach look like heaps of wilted weeds. They are given a bath in tanks of ice-cold water. This not only loosens the dirt, which settles to the bottom of the tank, but it revives the plants to the point of crispness. Then the greens are packed in hampers with a small piece of ice in the center and chipped ice on the top. Finally, the hampers are placed in ventilator cars and the spinach seldom fails to arrive in a tempting condition.

Almost every dining table has some food on it which has required special treatment or special carrying provision that it might make its journey from the place of its origin in a tempting and acceptable condition. Perhaps no better example of this can be cited than the banana.

Shipping bananas. In Costa Rica, between Vera Cruz and Colon, is Puerto Limon, the capital of what might well be called the Banana Kingdom. From here about fourteen million bunches of bananas are shipped every year, going to all parts of the civilized world. All the bananas are cut or selected according to the length and character of the journey which they must make. In other words, it will not do for any bananas in a shipment to become over-ripe before their destination is reached, because one bad bunch will spoil hundreds of others in the cargo.

One banana ship carries fifty thousand bunches of bananas in its hold. They are loaded by means of

Courtesy of United Fruit Co.

Loading a banana ship by means of a mechanical conveyor. The fruit, carefully selected according to the length of its journey, will be placed in rooms cooled by fans and refrigeration pipes

mechanical conveyors and are received into rooms already cooled to the right temperature by a system of refrigeration pipes and large centrifugal fans. This system keeps the cargo both cool and dry.

"Banana messengers." When the fruit steamer reaches its port the bananas are quickly transferred to cars properly refrigerated, or, perhaps, to cold storage rooms in a great fruit warehouse. A man is sent with every banana train to see that the bananas are kept in the best possible condition until delivered into the hands of the customers of the fruit company. These "banana messengers" must inspect the cars at division points, record the temperature, and take

the proper measures to cope with weather conditions in the territory through which the cars must travel. These cars are made so that they may be heated as quickly as cooled. At certain points they are inspected by resident "banana messengers" who check the work done by the men sent with the train. The United States receives each year, by this remarkable method of transportation, almost fifty million bunches of bananas. Whenever you see a bunch of bananas you can scarcely forget its wonderfully interesting journey from Central America to the cellar of the dealer in "the States"—a trip which has been personally conducted with as much care as if the bunch of bananas had been one of a number of human passengers.

Fish shipped alive. The lakes and rivers of Minnesota, Illinois, and Iowa abound in fish which are carried alive from their native waters and delivered to the cities of the East as lively and squirming as when they were first caught. While they are by no means the choicest kinds of fish, being mainly buffalo and carp, they are a boon to the people who buy them because they are sold at a cheap price and delivered in prime condition. The cars in which these fish are carried alive are furnished with large tanks through which run small pipes pierced with many tiny holes. Jets of air are constantly forced through these holes by means of an electrical air pump. By this device, it is possible to carry many fish in a tank and keep them in a good, lively condition to the end of the journey.

Old and new ways of distributing fish. In continental Europe fast fish trains distribute this food throughout that country in a most systematic and

economical way, very unlike the way fish were delivered in Austria a quarter of a century ago. At that time enormous tanks of water containing fish were hauled by from four to eight horses from Russia to Austria. Thousands of these fish were thus delivered alive to the various towns and sold in the public markets. As these towns were about fifteen miles apart, to take the fish from one town to another meant an all-day journey. By this expensive method, fish naturally became a luxury instead of the poor man's food as it is to-day.

Primitive methods of carrying food. The means by which foods are carried in countries where primitive conditions still exist are as interesting as they are varied and picturesque. The most primitive

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Women of Jamaica carrying fruits and vegetables to market

of all methods of transportation is the carrying of burdens by human beings. In nearly every country

or region which might be classed as barbarous or semi-civilized, a distinct method of human burden

Brown Bros.

Rice growers in Java transporting grain by means of shoulder poles

bearing has been developed. In Jamaica, for instance, market day finds long processions of women going to town with baskets loaded with vegetables and fruits nicely poised on their heads. This is really the characteristic way in which foods make their first journeys in all parts of the torrid zone.

Many ingenious things have been devised by man to enable him to carry greater burdens. Many laborers among Old World peoples use various forms of what the pioneer American farmer called the "neckyoke." This is a pole from each end of which

a burden may be suspended. In Java, for instance, the natives carry rice to market by means of shoulder poles of the simplest kind.

Journeying by water. Naturally water transportation is the most popular and the cheapest wherever it can be used, because it involves the least outlay of effort or power for the size of the burden carried. Rafts, canoes, boats, and ferries of many kinds are used for the forwarding of foods. But the most novel food craft that ever rode the waters is the coconut raft (see page 424), which looks like a huge circular mat made of unhusked nuts.

Pack animals as carriers. Where animal power is employed to transport foods, the "pack" is the

Courtesy of United Fruit Co.

From the faraway plantations of Central America, pack mules carry to waiting steamships many thousand bunches of bananas destined for American tables

most primitive form of placing the burden. The principal pack animals are the mule, the burro, the

horse, the camel, and the llama of the Andes. All these animals are extensively used to "pack" foods to and from remote and inaccessible points. The camel is the "ship of the desert" for the warmer parts of the Old World countries of Asia and Africa. In America the mule is the great mountain climber. The donkey is the almost universal burden bearer in the Old World and the New, and the pack horse is almost as common and as widely distributed.

If these animals did not carry food to miners, settlers, and others of the "advance guard of civilization," a large part of the world's pioneering would be impossible. If they did not bring foods from out-of-the-way places, many of our most pleasing foods would be much scarcer than they are now.

Journeying by cart and sled. The two-wheeled cart is probably the most typical vehicle for carrying foods in the old-fashioned way. The style of the

Courtesy of International Harvester Co.

Hauling wheat to market, Nairobi, Africa

cart varies with the place or region of its origin. The very simplest type of cart is that used in the

Philippines for hauling rice. The wheels are solid discs of wood and the "box" merely a rough platform.

Carrying supplies in Alaska by dog train Brown Bros.

The next stage in the development of the cart is typified by the wheat carts of Nairobi, British East Africa, drawn by the quaint humpbacked oxen of that region. The wheels are of wood, being heavy rims held in place by four crude spokes or cross braces. This vehicle has a somewhat elaborate box.

Dogs harnessed to carts haul much of the food in the Old World. In the Far North the sled is the common means of conveying food. In Lapland the sled is drawn by reindeer, in Alaska by dogs, and in Siberia or Iceland by hardy little ponies.

Motor truck and automobile. The motor truck and the automobile trailer are the latest and most improved means of food transportation. These modern carriers have almost revolutionized the bringing of foods from the field to the near-by markets. If we were suddenly deprived of them we should be made to feel their importance far more than we do now.

Chapter III

WHEAT

The world's harvest time. This is harvest time for wheat! Not a day passes in which wheat is not being harvested somewhere. Perhaps it is on the pampas of South America or the steppes of Siberia, but somewhere the sun will set to-night upon a harvest scene; somewhere the golden grain is falling

Brown Bros.

Harvest time in Kansas. Every day throughout the year a harvest field like this may be seen somewhere in the world

beneath the sickle or reaper. Somewhere, too, wheat is being planted to-day.

When the wheat fields of Dakota are covered with snow, the men of the Argentine are threshing wheat; and when winter grips Patagonia, a harvest moon shines upon the grain fields of Scandinavia. As we are sowing wheat in the United States it is being

harvested in the valley of the Nile, and as the Egyptians sow wheat the grain is being cut by Russians in Siberia. Thus we see that the process of the world's wheat production is an unbroken cycle.

A Calendar of the World's Wheat Harvests

January
- Australia
- Chile
- New Zealand

February and March
- Egypt (upper)
- India

April
- Asia Minor
- Cuba
- Cyprus
- Egypt (lower)
- India
- Mexico
- Persia
- Syria

May
- Algeria
- Asia (central)
- China
- Japan
- Morocco
- United States:
  - Texas

June
- France (southern)
- Greece
- Italy
- Portugal
- Spain
- Turkey (European)
- United States:
  - Alabama
  - Arkansas
  - California
  - Georgia
  - Illinois
  - Kansas

June (cont.)
- United States (cont.):
  - Kentucky
  - Mississippi
  - Missouri
  - North Carolina
  - Oklahoma
  - Oregon
  - Tennessee
  - Utah
  - Virginia
  - Washington

July
- Austria-Hungary
- Bulgaria
- Canada:
  - Quebec
- England (southern)
- Germany
- Roumania
- Russia (southern)
- Switzerland
- United States:
  - Colorado
  - Illinois
  - Indiana
  - Iowa
  - Michigan
  - Minnesota (southern)
  - Nebraska
  - New York
  - Ohio
  - Pennsylvania
  - Wisconsin

August
- Belgium
- Canada:
  - Alberta
  - British Columbia
  - Manitoba

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The wheat areas of the world. Arrows indicate the chief lines of export

August (cont.)
Canada (cont.):
Ontario
Saskatchewan
Denmark
Great Britain
Russia (central)
Poland
The Netherlands
United States:
Minnesota (central and northern)
Montana
New England
North Dakota
South Dakota

September and October
Norway
Russia (northern)
Siberia
Scotland
Sweden

November
Africa (southern)
Argentine
Peru

December
Burma
New South Wales

Wheat a universal product. Wheat grows on every continent, and, to some extent, is cultivated in every civilized country. Distinctively the white man's food, it may be called the universal food of the Caucasian race. Not only is wheat eaten chiefly by the Caucasian, but he has taken it with him wherever he has migrated. He has bred wheat to meet local conditions everywhere, although it has been found wild only in the temperate zone. Wheat was the chief crop of ancient Egypt and there is reason to believe that its cultivation antedated the Pharaohs. To-day this grain is cultivated on every continent and on all important islands of the seas. There are wheat fields in Canada less than six hundred miles from the arctic circle and in India within the torrid zone.

Civilization and the culture of wheat. The culture of wheat may be considered as a sign indicating the march of civilization. It should be noted that from the beginning of history the greatest wheat production has meant the balance of power among the nations. At least the strongest nations have

always been the great wheat producers. Far back in the early ages when wheat was the chief crop of ancient Egypt, her power was as wonderful as her civilization. The ancient Romans at the height of their power valued their granaries almost as highly as they did their armies. Many other examples might be cited to show that civilization, national power, and the cultivation and use of wheat have always been closely associated.

While England raises only a small fraction of the wheat needed to feed her people, among the possessions of the British Empire are to be found millions of acres of wheat land. It is fair to-day to call the United States the leading wheat-growing country of the world, but the time is near at hand when she must increase her production in order to provide enough for her own people.

Origin of wheat unknown. No one knows the age of wheat. History refuses to give us the date of its origin. We are told that the Chinese used wheat for food twenty-seven hundred years before the Christian era and that it has been known on the uplands of Syria and in the valley of the Euphrates and Tigris rivers for ages. Traces of buried wheat have been found in ancient tombs of Egypt, in the prehistoric lake dwellings of Switzerland, and in certain regions of Asia. But it is impossible to determine the exact age of wheat. Ancient history freely mentions the plow and speaks familiarly of cereals, among which is wheat. In fact, the oldest countries are those which seem most closely connected with this world-wide food.

Methods of cultivation. Wheat has been grown in the valley of the Nile for many ages. Each year

the people are putting more intelligent effort into the cultivation of this grain. Even the modern tractor

Courtesy of International Harvester Co.

Plowing on the upland plains of Palestine. Notice the crude plows

is occasionally seen in Egypt doing the work done centuries ago by the slaves of the ancient Pharaohs. But modern methods of sowing, cultivating, harvesting, threshing, transporting, and grinding wheat are not consistently practiced the world over. In parts of Syria and Russia the people are still content to use the same crude implements for cultivating and harvesting wheat that were used in Egypt and Rome thousands of years ago. Yet Russia is to-day the second largest wheat-raising country in the world, ranking next to the United States in the production

of that grain. In some years the Russian wheat harvests have even surpassed those of this country.

Courtesy of International Harvester Co.

Harvesting on the steppes of Siberia. Here camels furnish the motive power for an American reaper

Growing wheat in Russia. Wheat is produced in both European and Asiatic Russia, but the great bulk of the wheat lands lie in the so-called Black Earth district of Southern Russia. This enormous plain, probably in its depth of soil unequaled anywhere else on the face of the globe, yields, under almost primitive conditions of cultivation, much more wheat than is consumed in Russia. This surplus grain is sold in Western Europe, where not enough wheat is raised to feed the people. Poland, once an independent kingdom, is another great wheat-producing section of Russia.

On the vast steppes of Siberia there are many wheat farms, and here may be seen modern American farm machinery of every kind. Harvesters and

binders manufactured in the United States are used throughout this part of Russia, with camels serving as the motive power. Russia also employs modern oil and steam tractors which do the work of many horses. In fact, in all parts of the world one may see modern American power tractors at work where once slaves, camels, elephants, zebus, oxen, or horses furnished the driving power.

Sowing and harvesting in many lands. The sowing and harvesting of wheat differ widely in the various countries. In America machinery replaces man wherever possible, but in some parts of Russia, India, Egypt, Algeria, Palestine, and China the peasants and natives still cling to the crude ways of their forefathers. Many of them are too poor to buy machinery and others know too little of modern methods to use it. There are still many

Courtesy of International Harvester Co.

Harvesting wheat with the sickle in Algeria. Modern implements are gradually being introduced throughout the country

countries where wheat is sown by hand, harvested with a small hand sickle or a heavy "cradle,"

bound by hand, and then threshed with the old-fashioned hand flail. But the parts of the world

Courtesy of International Harvester Co.

Threshing wheat in Egypt. This is one of the Old World countries where the methods and implements of bygone centuries are still in use

where one may see the implements of bygone centuries in use are becoming fewer each year. Yet the ancient wooden plow—little more than a crooked stick—is still used to some extent in Syria, India, and China, while the implements of

the Japanese are often as crude as were those of their forefathers.

But we do not have to go to Old World lands to find ancient methods and ancient tools employed in wheat culture. Within twenty miles of Albuquerque, New Mexico, and in other places in the Southwest, we may see Indians raising wheat and corn under these same primitive conditions.

Looking back at one of the oldest countries we see India, with more than three times as many people as there are in the United States, farming by methods almost as far behind the times as those of the ancient Romans. There are, of course, certain regions in India where the progressive Briton has introduced modern farming methods, but as a whole the country is using the methods and implements of long ago. In the fields of India the buffalo, zebu, camel, elephant, and ox may still be found hitched to the ancient wooden plow. There, too, one may see hand sowing and hand harvesting and, at threshing time, the old-fashioned hand flail.

The wheat farms of the United States offer the best example of the modern way of raising this grain. Vast farms, many of them containing thousands of acres, are plowed by great tractor engines pulling as many as eight plows behind them. On some of these farms the plows are followed by the harrows and these in turn by the seeders, so that in one day, and at the same time, many acres of land are plowed, harrowed, and planted to wheat.

Perhaps nowhere else in the world does the wheat crop depend so much upon the whims of the weather as it does in India. Here seeding time is usually followed by long, heavy rains and storms called

monsoons. When, for any reason, these tropical storms lack strength or the rainy season is shortened, the wheat crop of India fails, and this failure usually means famine. We hear many sad stories of great famines in India, when hundreds and thousands of natives die for want of food.

Storing and shipping wheat. The handling and transportation of wheat have likewise undergone many changes. As in planting and harvesting, our methods of handling and transportation are the most advanced of all the world. Practically every wheat farm in the United States is equipped with modern machinery, and every farming center has its elevators for storing and shipping grain. The railroads of this country are equipped with every known device to facilitate the handling and transportation of grain.

Distribution of world's wheat crop. Few countries in the world raise more than enough wheat to feed their own people. Russia, the countries of the Danubian plain, the United States, the Argentine, Canada, Australia, and India always have wheat for sale. The United Kingdom, Germany, the Netherlands, Scandinavia, Belgium, Italy, France, and Brazil must all import a considerable part of the wheat or wheat flour they use.

Algeria was originally the granary of Rome. The Moors who later conquered it were not wheat eaters and as a result the growing of wheat in Algeria practically ceased. But in recent years, this crop has been re-established by the French government.

The world's crop of wheat is about 4,000,000,000 bushels. The United States furnishes about one fifth of the world's supply of wheat. By far the

greatest part of our wheat is consumed at home. In normal years we export on an average 150,000,000 bushels of wheat, including that ground into flour, while Russia under normal conditions exports

Courtesy of International Harvester Co.

Wheat ready for shipment. A familiar scene at Odessa, Russia, the leading seaport of the Black Sea

more than 170,000,000 bushels and the Argentine sells to other countries more than 90,000,000 bushels. The world's consumption of wheat is advancing steadily. The rate of increase is about 100,000,000 bushels a year.

Under normal conditions the United Kingdom is compelled to import about 220,000,000 bushels of wheat and flour a year, and Germany must import about 80,000,000 bushels. The Netherlands finds it necessary to buy from other countries approximately 20,000,000 bushels of wheat and flour a year and Belgium about 50,000,000 bushels. In fact, every country in Europe, with the exception of Russia, Bulgaria, and Roumania, must look to foreign lands for a large part of its wheat supply.

China does not raise wheat enough for each inhabitant to have even a small amount, but uses rice instead. In Japan, however, about 1,250,000 acres of land are given over to the raising of wheat and the yearly crop totals about 27,000,000 bushels. This indicates that the average Japanese farmer raises 21.5 bushels of wheat to the acre.

Results of intensified farming. In the United States the harvests average only 14 bushels of wheat to the acre. But in England and Germany intensified farming by a lavish use of fertilizer has been developed to such a degree that the farmers are able to produce an average of more than 30 bushels of wheat per acre. Intensified farming is also practiced in some of our states, the yield in Maine and Vermont having averaged as high as 29.7 and 29.3 bushels to the acre.

If all the land available for wheat were to be farmed under the method employed in England and Germany, the annual yield of wheat would stagger the imagination. But it is equally true that if all the land now devoted to wheat were to be farmed as land is farmed in some parts of Russia, the whole world would experience a famine in wheat such as

occurred in Russia in 1891 and 1892. Then thousands of Russians starved to death. That famine taught Russia a lesson and since then she has been doing much to improve her agricultural conditions.

Wheat industry employs many people. Everywhere a multitude of men and women are earning their living by working with wheat or wheat products. Every day huge ships loaded with wheat go back and forth across the oceans, and long trains

Courtesy of International Harvester Co.

Hauling wheat to market across the pampas of the Argentine

loaded with this grain move across the various countries. Every day millions and millions of dollars are spent for wheat.

Perhaps the wheat which furnished the flour your mother baked into bread to-day came from a farm thousands of miles away. The wheat that enters into the food set before the English child may have traveled many miles in a wagon or an automobile; it may have ridden in a great cart over the pampas of the Argentine; it may have been carried by ship and hauled in freight cars. This wheat may have been

planted, harvested, threshed, and handled in the old-fashioned, laborious manner followed in some parts of Russia and India, or it may have been produced on one of our great, modern, up-to-date farms.

If it were not for the men who devoted their lives to the study of how to grow, handle, and store wheat, you and I might often go hungry for bread. But the great grain experts worked faithfully at the task and gradually developed the modern elevator, in which wheat can be safely stored for many years. However, the crops that are now raised each year make it unnecessary to store wheat for use in future years and these elevators are used only to hold the wheat until the mills are ready to make it into flour.

Flour the chief wheat product. While some wheat is eaten unbroken or in its natural state, by far the largest part of it is turned into flour which in turn is made into various foods, such as bread and pastries. Then, too, a great deal of wheat is made into what is known as breakfast foods.

Macaroni. Next to bread and pastries, macaroni is one of the most popular foods made from wheat flour. Since the introduction from Russia, about 1900, of "durum" wheat, and still more since the European War increased the difficulty of procuring macaroni from Italy, the macaroni industry in this country has grown at a surprising rate. By the use of air currents and other devices, Italy's great climatic advantage of being naturally suited to drying macaroni has been overcome. The manufacturers now make artificial climates within their works that are under almost perfect control. Macaroni is made in many different forms, the most familiar being macaroni, spaghetti, vermicelli, and the fancy

letter and star shapes. It is highly nutritious, exceeding in food value both bread and beefsteak.

Brown Bros.

One of the most popular foods made from flour is macaroni. The dough is pressed through holes in the machine, coming out in long strings which are cut to the desired length and hung up to dry

Wheat on our bill-of-fare. Wheat flour appears on our bill-of-fare in many different forms. In fact, so wide is the range of its uses that at one meal it may appear on your table as an ingredient in half a dozen different dishes. For instance, if we were to consider how many ways it entered into our dinner we should probably find that we would have first of all, with our soup, crackers made from wheat flour; with our fish perhaps a sauce containing wheat flour and toast made from wheat flour bread. Then of course there would be wheat bread and perhaps macaroni made entirely of durum wheat flour.

With the roast we might have Yorkshire (wheat flour) pudding, or maybe there would be a fowl with

In the harvest fields of Australia Brown Bros.

dressing made of wheat bread. Our pies, our cakes, and our puddings would all draw heavily upon the wheat supply. Possibly instead of coffee or tea we might prefer a cereal drink containing wheat. A great factor at the athletic training table is plain boiled wheat and milk.

When at your dinner table to-night you spread a layer of golden butter over a slice of bread you will be adding the last link to one of the greatest business chains in the world to-day. The story of a bushel of wheat from the time it ripens at the end of a waving stalk in the warm sunshine until it is eaten as cereal, bread, cake, or pastry, is as interesting as the story of Robinson Crusoe.

The harvest. When the wheat is ready to harvest, many binders are sent clicking across the broad fields, cutting the grain, tying it in bundles, and

dropping it on the ground. Harvest hands follow these binders, pick up the bundles of wheat, and set them up in shocks. Later to the fields come the threshing outfits with their crews, and the bundles of wheat are fed to the buzzing separator. As the grain is separated from the stalks it runs out into sacks and the stalks are blown out through a long pipe into a rapidly mounting pile of straw and chaff.

The sacked wheat is then carried to a near-by elevator where it is weighed and put into storage. But not all the wheat is put into sacks; sometimes it is brought to the elevators in great tank wagons and dumped into a receiving bin. It is then elevated by chain cups or suction to a storage bin from where it is loaded through chutes into big grain cars. The grain is carried in these cars to large roller mills and converted into flour.

Flour milling. The history of making wheat into flour is long and contains many interesting stories, none of which, perhaps, is more interesting than one connected with spring wheat. Although only a bare half century since the superior qualities of this grain have been utilized, to spring wheat alone is due the beginning of the wonderful prosperity of the Northwest. And the secret behind this lies in the processes of milling. Spring wheat is especially rich in gluten, an element highly valuable in bread making. But under the old processes of milling, which reduced the grain to flour at one grinding, the bran — which is coarser in spring wheat — remained in the flour, discolored it, absorbed moisture, and caused it to spoil. Under a new process of successive milling, this dark-colored bran was removed. Then spring wheat came into its own. The vast

prairies of the Northwest were turned into fields of wheat, stretching for miles in every direction, and

A group of Minneapolis flour mills where thirty thousand barrels of flour are made each day

thus Minneapolis became the great flour-milling center of the world.

The value of the wheat depends upon the quality of the flour it produces. For this reason the United States government has maintained mills and laboratories where the exact milling qualities of each species of wheat can be determined. Then the farmers plant the variety of wheat on which the government reports most favorably. The chief types of wheat are known as hard, semi-hard, and

soft, red, white, and durum or macaroni. Wheat is also known as spring and winter, but this depends upon the time of planting. The milling qualities of these wheats vary and for that reason the price also varies.

As with the production of wheat, no one knows how long man has been making it into flour, or similar products. The crushed wheat of prehistoric man was very different from the fine flour made in our great modern mills. The ignorant savage who lived centuries before the Christian era could not produce with the aid of unhewn stones a flour similar to that made by the skilled workmen who operate the complicated machinery of the modern mill. But as man advanced so did his methods of grinding wheat. For many ages, the natives of all countries ground wheat between stones.

Invention of the saddle-stone grinder. The first step toward modern milling was taken when the saddle-stone grinder was invented. This was used by the ancient Greeks, Romans, Swiss, and Egyptians. China and other Asiatic countries also ground their wheat with this device and it is even now in use in some parts of the world. The natives in certain regions of Africa resort to the same methods of grinding their meal as were in use in the time of Abraham. The saddle stone consisted of two stones, the upper of which fitted into the hollowed top of the lower. The wheat or other grain to be ground was put into the hollow of the bottom stone and the upper stone was rocked backward and forward until the grain was reduced to a coarse meal.

From the time of the first saddle stone to the present era of steel rollers the process of making

meal and flour from grain has undergone many changes. Centuries of progress can be traced by the various developments of the flouring mill. Yet to-day practically every kind of grain reducer, from the saddle stones of the Egyptians to the modern tempered steel rollers, is in use somewhere.

Brown Bros.

Women of Palestine grinding flour with a quern

Family and state mills. In olden days the work of the miller was done by women and slaves, each family grinding its own meal. At that time there were no public mills and every house had its own saddle stone and its quern. Finally in Rome state mills were established and in these labored slaves and criminals. Oxen shared the labor with slaves. It was also the practice to put prisoners captured at war to work in the mills. The Roman mills were increased in size and gradually improved.

Introduction of the public mill. A little later the use of public mills was extended, and throughout almost all the civilized world the people were compelled to bring their grain to these public mills and pay a heavy toll for the grinding. The poor people much preferred to do their own grinding with their rude little querns. But the landlords and public officials, greedy for the toll, used harsh methods to

prevent the people from making meal or flour. Many times the homes were raided and the little mills destroyed or carried away.

Later types of mills. The water-power mill soon appeared, followed by the windmill. But it was many years before the steam-driven flour mill came into use. The water-driven mill was operated by the Romans before the birth of Christ and the windmill was introduced into England about 1200 A.D.

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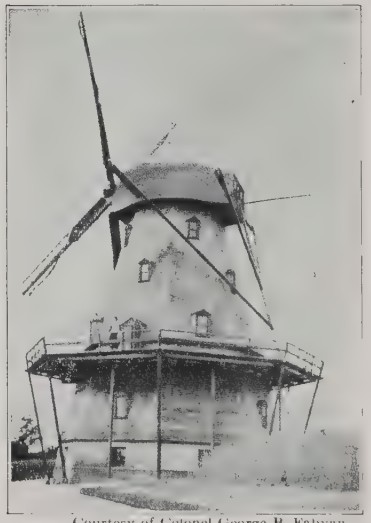
One method of grinding wheat in Manchuria, a region rivaling the United States in land area adapted to spring wheat

It was not until 1784 that the first steam-power mill was established in London. Recently mills operated by electricity have been erected.

Undoubtedly the finest example of a Dutch windmill in America stands on the banks of the Fox River at Geneva, about thirty-five miles west of Chicago, Illinois. It is part of the equipment of Riverbank Villa, the extensive estate of Colonel George B. Fabyan. It is seventy-five feet high and can grind one hundred and fifty bushels of wheat into flour in eight hours of good wind pressure. This quaint mill, which looks as if it might have been transplanted from Holland, was built in 1876 near Elmhurst, Illinois, by two brothers from the land of dykes. In 1915 it was taken apart and its pieces hauled by wagon a distance of nearly twenty miles to its present site. Old-fashioned burr stones are used in this mill and it grinds wheat, corn, and various other small grains.



Courtesy of Colonel George B. Fabyan

An old windmill of Dutch type at Geneva, Illinois

At the present time the most economical method of grinding is by water power, but it is only in certain places that sufficient power can be obtained. Minneapolis, Minnesota, which is the greatest milling center in the world, uses the power furnished by the St. Anthony falls of the Mississippi River.

To-day in the great mills of America and Europe

thousands and thousands of barrels of flour are ground daily between sets of tempered steel rollers. These grind the grain until it is reduced to a fine dust, known as our commercial flour. When you visit a great roller mill, and hear the whirr of the many busy machines, it will be interesting to recall what you have learned about the grinding stones of earlier days. You may think of the rude stones used by the savages, the saddle stones of the ancient Romans, the little querns of the poor people of Europe; the old water mills, in use for centuries, and still grinding wheat for the peasants; the picturesque Dutch windmills; the great modern steam and electric mills. Then you will realize how many years it has taken

St. Anthony Falls, which furnish the water power that has made Minneapolis the greatest milling center in the world

the world to develop machinery that will convert wheat into the fine white flour of to-day.

Chapter IV

OTHER GRAINS

A prehistoric food. The history of grain is as old as the history of man. Even our corn, although still unknown to most Europeans, has an origin reaching back into prehistoric times. Columbus found it widely cultivated by the Indians, but its use dates far back of 1492. There are evidences of its cultivation by the Mound Builders and it has been found

Papago Indian woman of Arizona grinding corn on metate stone—the most primitive method known

stored among the ruins of the Cliff Dwellers. No one knows when and how corn was obtained by the Indians. But it is from them that corn derived its name.

Corn is the biblical term for all grains and the word is still used in this sense in England. When an Englishman wishes to speak of our corn he says "maize" or "Indian corn."

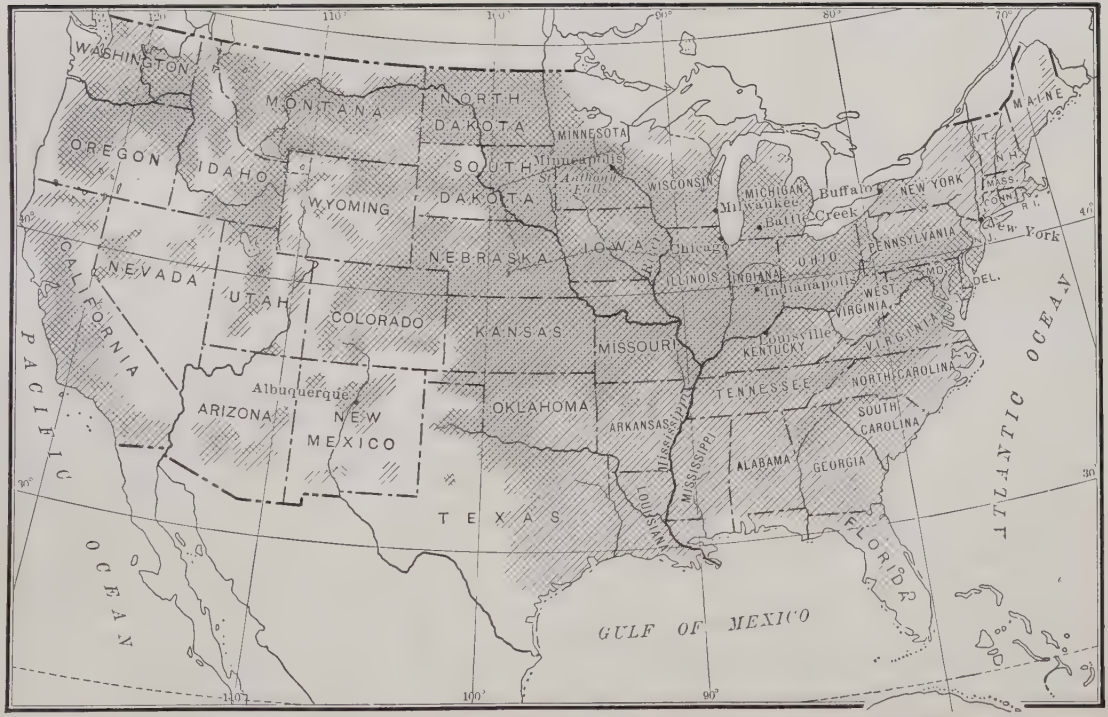
Varied uses of corn as a table food. Corn deserves a prominent place among table cereals. Green corn, usually eaten on the cob, and canned corn are the forms best known to those who live in the city. These are commonly "sweet corn." But the large, hard yellow or white ears of "field corn," which rejoice the hearts of many thousands of farmers throughout our country, are not by any means all destined to be used as feed for stock. Of the 3,000,000,000 bushels of corn raised in this country in a year many thousands of bushels are made into corn meal and hominy. These are staple foods in America, served daily on our tables as mush, "hasty pudding," muffins, johnny cake, and corn bread.

A few years ago the United States each year sold a limited amount of corn in Europe. In years when the price was low at home and corn could be sold in competition with the cheaper stock foods of the world, the quantity sold in Europe was somewhat important.

The value of corn as food for man has been little appreciated, even in our own country. It contains all the elements necessary for the sustenance of the body, furnishing heat, energy, and maintenance of life to an extent equal to that of any other cereal. It also has the advantage of a high rate of yield and a comparatively low cost of production.

There are many countries in the world where the food value of corn is unknown, and where the grain is considered suitable only for stock feed. European nations, however, are rapidly becoming acquainted with the true value of this substantial food.

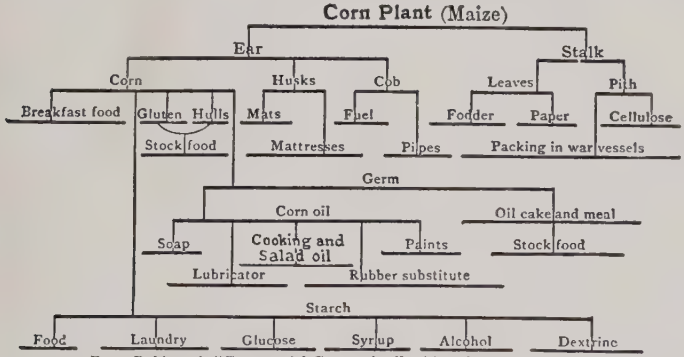
At the Paris Exposition of 1900 the United States commission maintained for six months what was known as the American Corn Kitchen. This was



The great cereal-producing area. The darker shading indicates where wheat grows

done at the suggestion of a few men familiar with the food value of corn. In this kitchen were cooked and served many samples of food of which corn formed the basis. Thousands upon thousands visited the corn kitchen and in this way many Europeans were taught the value of corn as a table food.

The same exposition contained an exhibit which demonstrated the fact that in corn America possesses a product with as wide a range of usefulness to the human race as that claimed for the bamboo. This



From Robinson's "Commercial Geography." After Corn Products Mfg. Co. data

Industrial uses of the corn plant

exhibit contained sixty distinct articles of commerce, all true products of Indian corn. It included among other things meals, flours, starches, sugars, oils, rubber substitutes, and cellulose.

Originally it was thought that field corn could not be successfully grown in the extreme northern states. But now it is raised as far north as Minnesota and the Dakotas, and both sweet and field corn may be found growing in many parts of Canada.

The only real rival our country has as a corn-growing state is the Argentine. In that country in

the neighborhood of the Paraná River there is a large area which by reason of soil and climate is wonderfully adapted to the growing of this grain. As very little corn is used in any form in the Argentine, a large part of the crop, which now exceeds 300,000,000 bushels a year, is available for sale to the importing countries of the world.

The value of corn to the people of our own country can scarcely be estimated. Its direct use on our bill-of-fare in the form of green corn or canned corn is trifling compared with its use in the form of beef, pork, mutton, poultry, milk, butter, cheese, and eggs. As a food for animals and fowls it is the basis of all meat products in this country. While corn has always played an important part in dairying, its usefulness in the production of milk has been

Scene on a dairy farm. The use of the silo has greatly increased the importance of corn in the production of milk

multiplied many times since the silo has become general throughout the dairy districts. When field

corn is cut into ensilage or is shredded, all of the corn plant except the stump and roots is consumed.

The American canning industry draws largely upon sweet corn. In a single year more than 240,000,000 cans of this splendid food are put up by the canners of this country.

Millions of dollars' worth of various commercial products are made from the field corn of this country each year. Among these are sirups, starches, glucose, sugars, and various dextrines, or gum saps.

Oats a popular breakfast food. Practically every one of you finds on your breakfast table, at least once a week, and perhaps seven times a week, our modern descendants of "porridge." To our grandparents there was but one food made from oats and that was oatmeal mush or "porridge." Grandmother would take her basket to the store and buy so many pounds of oatmeal, which the grocer would take out of a barrel with an old-fashioned wooden scoop and weigh into a paper bag.

To-day table oats are handled in a very different way. There are as many varieties of foods made of oats as you have fingers and toes. Perhaps the rolled oats are now most widely known. These are put up in sacks, barrels, cartons, and cans of various shapes and sizes ranging from one pound to one hundred and eighty pounds.

While there are many other kinds of cereal and patented breakfast foods sold, yet it is said that the United States consumes as food about 1,750,000 barrels, or 315,000,000 pounds, of oats a year. Besides this many million bushels of oats — by far the greater part of the world's crop — each year are fed to live stock.

America the greatest producer. With an average annual yield of more than a billion bushels, the

Courtesy of International Harvester Co.

A Wisconsin oat field. The oats raised in Wisconsin are among the finest in the world

United States is the largest producer of oats in the world; Russia ranks second, Germany third, and Canada fourth. Like wheat, oats can be raised in almost every country and are, perhaps, even hardier than wheat.

In America oats are grown in all the northern and western states. The South produces a small quantity, but the oats from that section are used almost entirely as stock food. The finest oats are said to be raised in Canada and in Illinois, Iowa, Wisconsin, Minnesota, and the Dakotas. Iowa and Illinois are the greatest oat-producing states in the Union. Oats are raised in Alaska, but only for stock feeding.

Exports to other countries. Oats are shipped yearly from the United States to every civilized country on the face of the globe, and to some not civilized.

Because of the wide range of the distribution of American oats it would be possible for oats harvested from the same acre in Iowa to be eaten in several different countries and by people of several different races. One pound of oats from an Iowa field might be eaten in China by the yellow man, another in Africa by the black man, another in the West by the red man, and another in Norway by the white man. Oats off the same acre in Minnesota might be eaten by the fisher folk of Iceland and the sheep raisers of Australia.

While we raise more oats than any other country, we are at times compelled to import them. Our importations are mostly from Canada, although occasionally we buy some from the Argentine.

Where rye is grown. Rye belongs to the wheat family. It is very hardy and will thrive under conditions too poor for most other grains. It succeeds best in a cool, moist climate. This grain furnishes food for an enormous part of the world's population, but probably has a smaller distribution than any other cultivated grain. The world's production of rye, roughly speaking, is about one half as great as that of wheat. More than one half the total yield of rye is grown in Russia, where almost 800,000,000 bushels of this grain are produced yearly. Rye is the standard bread grain of the peasants of that country, who eat this cheaper grain and sell their wheat abroad. Next to Russia, Germany grows the largest amount of rye, producing about one half as much as Russia, or about one fourth of the world's supply. In the United States the rye crop is the smallest cereal crop grown, amounting to about 40,000,000 bushels a year. Very little rye

rye is produced in the countries outside of Eastern Europe—Russia, Germany, and Austria-Hungary growing about 90 per cent of the world's rye crop.

Courtesy of International Harvester Co.

Harvesting rye. In Northern Europe rye is the principal cereal and throughout this region rye or black bread is one of the chief foods of the people

Food value of rye. For many reasons rye might be classed as a neglected food in this country. As far as nutritive value is concerned, it is equal to any other cereal, not excepting wheat. It has never been a popular breadstuff in most countries, however, because of the color of its flour and because of its lack of gluten, the quality in a grain which produces light, aërated bread.

Rye is prepared in a number of ways, one of which is called rye flakes. It is also used in a great many of the prepared breakfast foods and cereal drinks. Pumpernickel is a dark German bread made of unbolted rye. It is very heavy and slightly acid, as it is made from fermented dough. It is

handled in the better class of delicatessen stores in this country. Sometimes it is imported from Germany, but usually it is made here.

Mankind's first cereal food. Barley, another historic grain, is said to be the most ancient food of man. Several varieties, one the sacred barley of the ancients, were known to the lake dwellers of Switzerland. It was cultivated, we are told in the Bible. in ancient Egypt, and was also the chief breadstuff of the Hebrews, the Greeks, and the Romans.

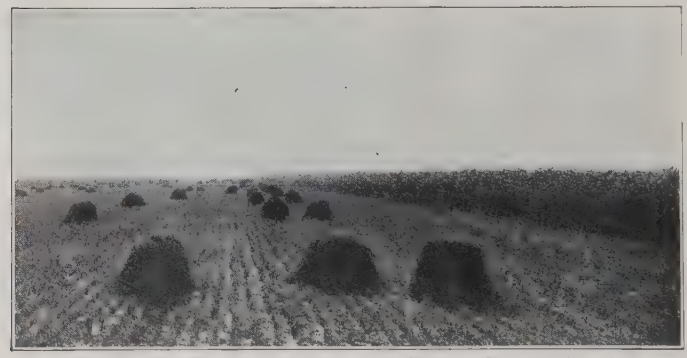
Production of barley. The growing of barley is much more evenly distributed than that of rye. It is the hardiest of all cereals. It ripens in Norway beyond the Arctic Circle. While the limit of cultivation extends farther north than any other grain, it also flourishes in semi-tropical countries.

Courtesy of International Harvester Co.

Harvesting barley in Norway. Barley can be cultivated farther north than any other grain

The world's yearly production of this grain is a little less than that of rye, amounting to about

1,340,000,000 bushels. Almost 30 per cent of the total crop is grown in Russia, where it is exten-



A field of millet. Although in the United States millet is used chiefly as fodder, in some places it is used in the same way as rice

sively consumed as food. However, barley is usually grown as food for animals and for brewing purposes.

The annual crop of the United States is about 170,000,000 bushels, this country ranking second among the barley-producing countries of the world. It is interesting to note that Japan ranks fifth in the production of barley, raising about 85,000,000 bushels yearly, whereas its production of other grains, with the exception of rice, is small.

Value of barley as a food. Barley contains less protein and carbohydrates but more fats and salts than wheat. There is a barley bread used more on account of its agreeable flavor than because of any special food value. In the United States barley is used to a considerable extent in soups, or mixed, finely ground, with infants' foods; but the consumption of the grain in this country is small.

Millet at home and abroad. Millet, the smallest of the grain foods, is used in some localities in the same way as rice, but the greater part of the millet grown in this country is used as green fodder. The ripe seeds are used as poultry food. We import millet from Germany and Italy, where it is used in large quantities in soups. We use the yellow Italian millet to some extent for puddings. But the larger portion of this product is sold here as food for cage birds. In Peru a variety known as Guinea maize is grown, from which is made a white flour of good flavor.

The grain that feeds one third the world. Rice is the most intensively cultivated of the world's grains, and forms the principal food supply of a large part

Brown Bros.

A rice field in Texas. Rice was introduced into the United States in 1700, the industry grew slowly, but within recent years the production has increased steadily

of the population of the world. In volume the rice crop stands alongside that of wheat. The world's

annual production of rice amounts to about 170,000,000,000 pounds, to which the United States contributes a little more than 600,000,000 pounds, or one third of one per cent. We import about 130,000,000 pounds of rice yearly.

Until a few years ago the United States imported practically all the rice we used. In the beginning of the industry in this country rice was produced only in small quantities in the Carolinas and in

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Cultivating a rice field in South Carolina. This state was one of the first in the United States to engage in the cultivation of this grain

Georgia. But in recent years the cultivation of rice has moved to Louisiana, Texas, Arkansas, and

California. The rice production in these states has gradually increased, until in 1916 the crop amounted

Courtesy of International Harvester Co.

Hauling rice in the Philippines. Rice is the chief food of the natives and the grain produced in the islands is of high grade

to almost 42,000,000 bushels or 1,176,000,000 pounds, the yield being nearly 48 bushels per acre. This was the largest rice crop grown in the United States at that time, but undoubtedly the production will continue to increase. The Philippine Islands also produce a high grade of rice.

It is not possible to determine accurately the amount of rice produced in China, but it is reasonable to place the yield at between 50,000,000,000 and 60,000,000,000 pounds a year. The annual rice crop of British India amounts to about 70,000,000,000 pounds a year, which is almost 40 per cent of the world's entire crop.

Rice producers the rice consumers. The great rice-producing countries of Asia—China, India, and Japan—are also the great rice consumers. China

consumes its entire harvest. Japan imports large quantities of the cheaper grades of rice and exports

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Japanese rice planters at work. The rice is transplanted about two or three weeks after the sowing of the grain

much of its grain of better quality. In many parts of China and Japan rice and fish and a little tea make up almost the entire diet of the people.

Growing rice in the Orient. More than 50 per cent of the tillable land in the three main islands of Japan is devoted to the growing of rice. In Taiwan (Formosa), as in the southern part of China, two crops of rice are raised each year. China has almost eight thousand square miles more of land devoted to the raising of rice than is given over to the growing of wheat in this country. At the same time the Chinese are able to produce almost twice as much rice to the acre as we produce wheat. Thus you see what a wonderful rice harvest China has each year.

Only a small percentage of the rice crop is grown on dry land, the greater part of it being raised in standing water. The rice fields are divided into

small plats and flooded from the irrigation canals, of which there are several thousand miles in China and Japan. Where the land is rolling, small plats are leveled out on the hillsides, or graded into terraces, surrounded by narrow, saucer-like rims to hold the water. These little rice plots are cultivated with a thoroughness seldom, if ever, seen in our own land.

The way in which these Orientals utilize every inch of ground, sparing neither time nor labor to obtain a good crop, is remarkable. Without modern machinery of any kind, they transplant practically every spear of rice growing on that vast area of rice fields. We wonder at the patience and persistence of the Chinese farmer, who is painfully and laboriously using a foot pump to draw water from a canal to flood the tiny patch of land on which his wife and children are working.

This irrigation is not made necessary by an exceptionally dry climate—for the rainfall in many rice-growing sections is heavy—but because the rice requires an unusual amount of water. And these fields are continually being fertilized, not because the land is worn out or run down, but because the Orientals have learned in their four thousand years of farming that one cannot continually take from the soil without giving back, and that to feed the soil is surely "casting bread upon the waters."

Growing rice in the United States. While rice apparently yields best on lowlands, if there is an abundant water supply and if the fields are properly irrigated, large crops can be raised on land not naturally swampy. In the United States the most fruitful rice lands are in the coastal plain region of the Southern States. The planting of rice is done

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in America by plowing and disking the land and then pulverizing the soil as finely as possible. Then the seed is sown, either broadcast or with rice seeders, which plant it in drills about four inches apart. When rice grown in this way is about six inches tall the fields are flooded by irrigation, the water being allowed to remain on them until the grain begins to mature. The water is then drained off in order to allow the fields to dry out for the harvest.

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A rice-polishing machine

Food value of rice. Rice is highly nutritious, easily digested, and very palatable. Yet in America the most nutritive part of this grain is often sacrificed for the sake of securing a more attractive appearance. At least this is true when polished rice is considered. Unpolished rice contains much more food value than polished rice, and the natural brown head rice is most valuable of all.

A Comparison of Food Values

	Rice	Potatoes
Water	12.2 per cent	78.3 per cent
Protein	8.0	2.2
Fat	.3	.1
Carbohydrates	79.0	18.4
Mineral matter	.4	1.0
	100.0 per cent	100.0 per cent

The rice kernel is composed of a starchy central

portion, around which is a delicate, nutritious covering. When the housewife learns to prefer the unpolished rice, especially the natural brown rice, she will get more food of this kind for the same money and the men in the rice industry will be saved the labor and expense of polishing. The unpolished grain is dull of color, and has a white, dusty appearance. The polished rice is a shining white product that glistens.

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Stones for hulling rice and removing the chaff

Rice used in varied ways. Rice is used in a great variety of ways. It will furnish a substantial base for a meal, or can be made into a dainty dessert. An excellent soup can be made with it and a still better pudding. It is both pleasing and healthful. In one respect rice stands almost alone—it is a favorite food with all races, because it receives readily the characteristics of any desired flavor. The Italian, who likes rich foods, prepares rice with oils and finds the dish suited to his palate. The Mexican uses rice with chili to produce the "hot" sensation he likes with his food. The Englishman takes it highly spiced with fruit sirups, and the American uses it with tomatoes and soups.

America makes and imports large quantities of rice flour and rice meal. In Japan and China rice flour is used for making bread and other articles of food.

Chapter V

BREAKFAST FOODS

Evolution of the breakfast. The breakfast of to-day bears little resemblance to that of twenty or thirty years ago. In fact, a great industry has grown out of the changes that have come over our morning meal within that period. Many millions of dollars are now spent every year for breakfast foods either unknown or neglected a decade ago.

Probably no other meal has been so completely revolutionized by modern inventions as breakfast. In the main it has been changed from a heavy and unattractive offering of food to a light and wholesome meal. This evolution of the morning meal has meant more perhaps to the children than to any other members of the family. Is it not true that the refinement of breakfast foods has made the breakfast hour almost as much "the children's hour" as is twilight at the close of day? Because it has had much to do with the better nourishment of children, the modern breakfast food has brought about a wholesome change in the diet of practically all civilized peoples.

If the millions of dollars this country expends every year for breakfast foods had been paid for the research work necessary to develop them, that investment would have been justified because of the beneficial effect of this form of food upon the world of children and invalids.

The beginnings of breakfast food. Until a few years ago "porridge" and mush were about the

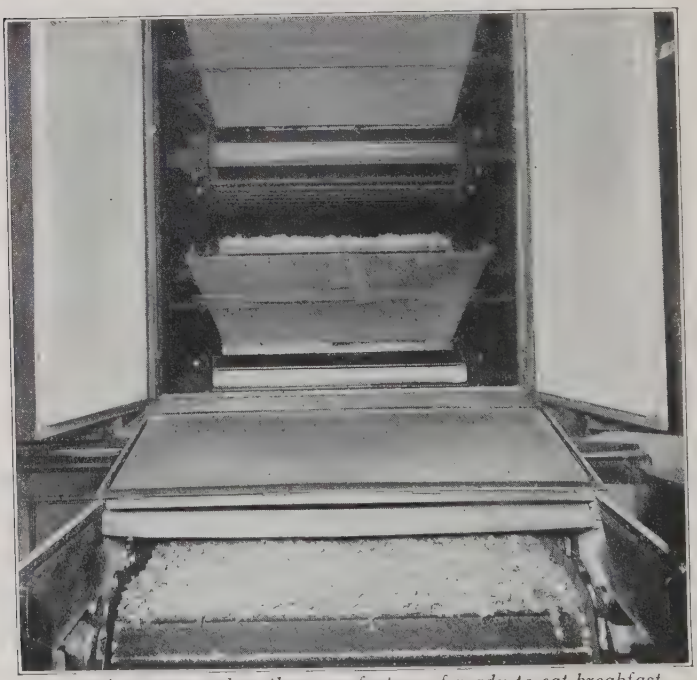
only forms in which grains were commonly served as breakfast food, unless pancakes could be classed under this head. An old English dish, known as frumenty, was made by boiling wheat kernels with milk and spices. But the American breakfast table was slow to receive the cereal breakfast food. Not until it was refined into a really appetizing food and brought to the attention of all the American people through national advertising did it become popular.

Courtesy of U. S. Dept. Agr.
A bunch of wheat

Preparation of present-day breakfast foods. To-day cereals are prepared for the breakfast table in many artful ways. They are puffed, rolled, cracked, ground, shredded, malted, and flaked. In speaking of the ways in which these breakfast foods are prepared the United States Department of Agriculture says: "The ready-to-eat brands are prepared in a great variety of ways. Some are probably simply cooked in water and then dried and crushed; some are made of a mixture of different grains; some have common salt, malt, and apparently sugar,

Courtesy of U. S. Dept. Agr.
A bunch of oats

molasses, or other carbohydrate material added to them; some probably contain caramel or other similar coloring matter. Those with a flake-like appearance are made like rolled grains, save that



Toasting oven used in the manufacture of ready-to-eat breakfast foods. Toasting not only makes the food crisper but adds color and flavor

the cooking is continued longer. Those which look like dried crumbs are probably made into a dough, baked, crushed, and browned. The shredded preparations are made with special machinery which tears the steam-cooked kernels into shreds and deposits them in layers or bundles. Very many of

the ready-to-eat cereals are parched or toasted before packing. This gives them a darker color, makes them more crisp, and imparts a flavor which many persons relish."

The process by which puffed foods are made is possibly the most interesting and ingenious of all. The kernels of the grains to be puffed are carefully cleaned and then cooked with live steam in a gunlike cylinder. When the steam has thoroughly saturated the kernels and raised them to a terrific heat, they are shot from this gunlike cylinder into cold air. As a result the heat that is within the kernels causes them to swell or puff to several times their natural size.

Growing and marketing oats for breakfast food. As oats undoubtedly furnished the first cereal breakfast food, let us study the preparation of this grain for our breakfast table.

This is the story of a two-pound can of rolled oats. The oats which went into this can were harvested in an Illinois field. They were cut, bundled, dropped to the ground by a clicking reaper, then bound, shocked, and stacked. After they had cured in the sun, so that they would not sweat when put into elevators, the oats were threshed and hauled to market.

Testing the oats. The oats were then put into an elevator, hauled up into a high bin, by a long belt set with iron cups or pockets, which operated in a hollow, boxlike shaft. From the elevator they were finally shot down through a tube into a grain car. This car carried them to a large city where they were sidetracked. The next morning an inspector came and took three samples of the oats in the car, one

from each end and one from the middle. He took these samples in order to test their milling qualities. Millers always carefully test oats to see whether they are properly cured and whether they have sufficient density and weight so that they will mill into a good product. Should the oats not meet their requirements, they are rejected.

Through the cleaning machines. As the samples in this case were found to be satisfactory, the oats were accepted and hauled to the mill, where they were sucked through big iron pipes into large storage bins. But they were soon taken from the bins and sent through a cleaning machine having many parts. One section of this machine consists of shaking screens which remove the wild mustard seed which is mixed with the oats. Another part tosses the oats about in strong blasts of air, which blow the chaff, grass seed, and other impurities from them. Still another section of this machine sucks the oats through a big shaft and lets the stones and heavier elements drop into a box below.

What kiln drying does for oats. From the cleaning machine the oats were sent through the "clipper," where their tails were cut off. Next they were sent to the kiln drier where hot air, coming through the floor, kept blowing them up in the air and stirring them about. There are other ways of kiln drying, one of which is to put the oats through a machine something like a coffee roaster. Still another method is to dry them in big open pans over the fire, as tea is sometimes fired. The first way, however, is the quickest, requiring only about three quarters of an hour for a carload. This drying, or roasting, develops the flavor of the oats, just as it

does with coffee. The oils in their tiny cells are released and flavor the whole grain. The mill with the best roasting system makes the best oatmeal, rolled oats, or other cereal.

Hulled, steamed, and rolled. From the dry kiln our oats went through a huller, which is the cleverest piece of machinery in the modern milling plant. The grains passed through its rollers and were

In the cook room of a great mill where a ready-to-eat breakfast food is manufactured

jostled about just enough to remove their coats. Those which slipped through without having their hulls removed were automatically "tailed back" or sent through again by the machine. Some went through three or more times. The hulls were blown away by air blasts. When the oats came out of that machine they were called "groats."

The next process was that of steaming the oats for about twenty minutes to make them soft for

their passage between the big polished steel rollers. They were still moist with the steam when sent through the rollers and flattened into flakes.

Packed, labeled, and sterilized. Some of the oats were passed to a machine which put them into cardboard boxes, sealed the boxes, and placed labels on them, all without their being touched by human hands. Next they went into a sterilizing room having a network of hot steam pipes. Here the packages were dried under a heat sufficient to sterilize them thoroughly and kill any unwholesome germ that might, by any possibility, have survived.

But the oats we are following were not put into a package. They were sent to a big press which forced them into a tin can under great pressure. There were two pounds put into that can, which was then sealed and sent to the sterilizing room.

In the Antarctic. Suppose our two-pound can, whose history we have been following, was one of the cans bought by Captain Scott and Lieutenant Shackleton and put aboard their ship which, in 1901, made a dash for the South Pole. The good ship was on the water for many, many days and was finally frozen in the ice of the Antarctic Ocean, where it was held prisoner for two winters. During that time many cans of oats were eaten by the brave explorers. The men had a terrible time, and suffered much from cold and hunger; but they were determined not to die of starvation, so they were very frugal of the oats, because they did not know how great might yet be their need. It was a hard struggle for them to keep life within their bodies. The men greatly needed a more generous allowance of food, yet they hoarded their provisions.

How long oats keep. When they finally escaped from that awful ice prison and sailed back to sunny waters and to civilization, two cans of the oats were unopened. These were brought back and exhibited. Finally, to determine whether or not the oats were still sweet one can was opened. The contents were pronounced as pure and good as ever! The other can is being shown to thousands of people each

Harvesting oats in a field that a year before was free range. Thousands of acres of grazing lands in our western states are now yielding cereals which, converted into breakfast foods, are shipped to all parts of the world

year. In 1917 it was about seventeen years old, and some day, perhaps, it will be opened before many people, and then eaten.

Who can tell where the remainder of the oats from that Illinois field went? Can you imagine? Perhaps they went to Iceland or Siberia, to Tasmania or South Africa, or perhaps some of them may have been served on your table, or on mine.

Why cereal foods are popular. Oats, wheat, corn, rice, and barley prepared in many ways and mixed into numberless combinations give the American a wide range of breakfast cereals from which to choose. All are nutritious, none contain harmful adulterants, and practically all are palatable and tempting to the average man or woman, boy or girl. Because these foods reach the consumer in a convenient, sanitary, and attractive form and because they furnish simple, abundant nourishment at low cost, they are daily growing more popular in this country. We are consuming millions of dollars' worth of them each year. We also export great quantities of this class of food to all parts of the world.

"Made in U. S. A." America is the home of the breakfast food. It is a far cry from pioneer days and the original American breakfast food, the samp and hominy of the red man, to the breakfast foods of the present time. In the United States to-day many great mills and factories and thousands and thousands of men and women, boys and girls are busy preparing wholesome, convenient, and nourishing cereal foods for the tables of the whole world. Those who grow the grains from which these foods are made, those who help in their manufacture, and those who sell them, are all entitled to feel that they have a worthy part in giving the world a most welcome addition to its food supply.

Chapter VI

FRUITS

Countries known by their fruits. Aside from its people, there is perhaps nothing that gives to a country or a locality so personal and distinctive a touch as its fruits. The mere mention of the word California seldom fails to bring to mind a picture of dark green trees hung with golden oranges. The fig is inseparably associated with Turkey and the date with Persia and Arabia, while Panama or any of the Central American countries suggests great clusters of bananas to the mind of the average boy or girl of the United States.

Man's wants the motive power of industry. The earth's pleasant fruits are about the most interesting teachers of geography we could possibly choose. They are capable of opening up to us a world of information about the soil, the climate, and the people of their particular regions. If you do not see how the fruits of a country can throw any special light upon the character of its people, remember that the abundance of wild fruits of a highly nutritive character in certain tropical countries has more to do with making the natives indolent and improvident than almost any other cause. Why work when wild fruits, capable of sustaining life, are to be had for the picking? And why provide for the future when nature alone does that, by loading the forest trees and shrubs and the jungle thickets with such an astonishing variety of fruits that every season's dinner is always at hand? This is certainly more

than a hint as to how the fruits of a region influence the character of the inhabitants.

Geography by way of fruit store and peddler. No geographic excursion, easily recruited and carried out, is likely to yield you any more pleasure and knowledge than an invasion of some large city fruit market. If you take such a trip under the guidance of your teacher and under conditions favorable to learning something about the things you see, you will surely return with a fund of knowledge that will surprise and delight you. Such an excursion will throw an entirely new light upon the subject of geography.

Courtesy of George C. Roeding

Capri figs growing on an embankment

There is still another way of getting an interesting insight into the geographic realm which fruits will open to you. This is by persuading a fruit man from a foreign country to talk to you. Almost any Italian or Greek fruit peddler who remained in his native country until grown, if he speaks intelligible English, is capable of giving you a talk on the fruits of his country that will give you a nearer view of his native land than you could get in almost any other way. In some ways his talk will be more interesting because his life in the Old Country was

spent in manual work instead of in study. This means that he has worked among the fruit trees and shrubs himself and knows by personal experience all about their habits and the methods of cultivating them.

One of the most interesting talks to which the writer ever listened was made by a Dalmatian who vividly pictured the beauty of the terraced fruit gardens of his mountain home so laboriously built up with leaf-mold retained by stone walls. He taught geography with a realism that fixed the scene and facts permanently in the memory of his hearer. His regard for the fruits of his country was somewhat like the affection he had for its people.

One of the fifteen hundred descendants of the wild crabapple

Apples a temperate zone fruit. Let us now consider a fruit of about fifteen hundred varieties which

ripens into a myriad hues and possesses a wonderful range of flavors that please the whole world's taste.

Apple blossom time in a commercial orchard in Michigan. This is one of the greatest of our apple-producing states

The apple? Of course! It is perhaps the oldest of all temperate zone fruits. Our present varieties have all been developed from the wild apple, of which the wild crabapple is possibly the only surviving type. Although the apple is found in certain altitudes of the torrid zone, its real home is in the temperate zone, where it has a wide distribution.

We export many thousand barrels of fresh apples and many million pounds of dried apples each year. These products are sent to almost every country in the world. It would not be possible to name

every country to which apples are sent from our ports, but the heaviest shipments are to the British Isles, France, Germany, Russia, and Australia.

Apples in the United States. It is hardly possible to give an accurate estimate of the quantity of apples produced and consumed in this country in a year. There are millions of apple trees bearing fruit in the United States. It is said that if all the apples grown in this country in a year were placed in cars they would make a train that would reach from Chicago to San Francisco. The United States leads the world in the production of this wonderful fruit. But we must remember that the apple is only one of the many fruits raised and consumed in America.

Picking Kieffer pears in Colorado

Pears. Pears are almost as universally grown as apples, and are to be found in every fruit store. There are nearly a thousand different varieties of pears. Some pears are almost as small as a thimble and on the island of Jersey are grown pears of enormous size which have sold for as high as six and seven dollars each in London. Find the island of Jersey on your map. Pears grow wild in Southern and Eastern Europe and generally throughout Asia. Like apples, pears are grown in almost

every state in the Union, and are exported mainly to the British Isles and the continent of Europe, although many other countries receive small quantities of them.

Peaches. The peach is considered by many the most delicious of all fruits and its excellent flavor justifies this high opinion of it. A member of the almond family, it is a native of Western Asia, but

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Peach orchards in one of the most fertile valleys of Colorado

has responded to influences of the soil and cultivation in this country to such an extent that the peaches grown here are considered as fine as any the world produces. Because the peach will not keep under ordinary conditions we find that our peach exports consist almost entirely of the dried fruit.

In American horticulture perhaps the most remarkable recent achievement is the propagation

of a distinctly new type of peach that promises to revolutionize the shipping possibilities of fresh peaches. This wonderful peach stands long shipment practically as well as the more tender varieties of apples. Severe tests of its ability to stand up under long and hard journeys have been made and it has been found that it can be sent from coast to coast without suffering any marked decline in its condition. This means that many places, remote from shipping centers, which have been obliged to go without fresh peaches, need do so no longer. A long ocean voyage is easily possible for this new peach, which is large and of fine texture and flavor. It also possesses the peculiar attraction of having a skin that is practically without fuzz.

The nectarine, a cousin to the peach. The nectarine is a highly prized variety of the peach family which can be grown only in warm climates. California and her sister states on the Pacific coast produce the greater part of the supply grown in this country. The nectarine can be successfully grown in the North only under glass.

Plums, native and cultivated. Our plum is said to have come from the European sloe or blackthorn. The sloe has a blue fruit, a little smaller than our wild plum. The plum is cultivated in many parts of our country and grows wild in almost every state. No doubt you have picked wild plums; if you have you know something of the fun that the boys of Europe have in gathering the wild sloe.

There are three general classes of plums cultivated in this country: the purple, the red, and the yellow or green plum. The loquat, a small, yellow, oval-shaped, plumlike fruit now grown in America, is a

The world's principal fruits and where they are grown

native of Japan. When ripe it is pleasing in taste, and may be eaten either raw or cooked.

Prune plums. Prunes are dried plums of a particular variety. They are grown especially for the making of prunes and even when fresh are called prunes by the growers. Until about twenty-five years ago almost our entire supply of prunes came from Europe; from France, Germany, Turkey, Spain, and Austria-Hungary. Now our Western States not only supply our own wants but export many tons of this fruit to the European countries. But there is still a market here for fancy prunes, which we import from France. These French prunes are considered especially choice and delicious. That we import a certain commodity from a particular country to which we export that same kind of food is sometimes explained by the fact that our own naturalized citizens or alien visitors from that country demand the "home article" because they are fond of its distinctive flavor. Thus does a commercial demand for a food emphasize the fact that we are a nation made up of people from almost every part of the earth.

The cherry at home and abroad. Is there one among us that does not hail with delight the arrival of that delicious early summer fruit, the cherry? Cherry season has pleasant associations for the men and women, boys and girls who have had the privilege of visiting, at picking time, the localities where cherries are grown. Though the cherry is a small fruit it does not occupy a small place in the diet of the human race. In some parts of the world, in fact, it is a really important part of the food supply. In France, there are forest regions where the cherry is an important item in the food of the people.

There the gathering of wild cherries is a big event in the year. In Germany, in the valley of the Rhine,

A street scene in Japan in cherry blossom time

the schools are closed during the cherry season, so that the children may help their parents harvest this delicious fruit. Though a native of Persia, the cherry is now cultivated all over the world. It is said that the Romans of long ago cultivated several different varieties of cherries. In Japan the cherry is extensively grown for its beautiful pink blossoms.

Food uses of the quince. The quince is a member of the pear and apple family and is native to Asia. It is now widely cultivated and may be found in most civilized countries of the temperate zone and the tropics. The majority of the quinces raised in this country are grown in western New York. While the quince is seldom eaten raw, it makes an excellent jelly and is much used by the housewife for flavoring preserves, jellies, and jams. The quince has long

been a favorite fruit of mankind. It was popular with the ancient Greeks and Romans.

The apricot. The apricot is a small yellow fruit which looks something like a peach, though it belongs to the same family as the plum. Like the peach and the plum it may be eaten raw, preserved, or dried. This fruit was introduced into Europe during the time of Alexander the Great. Now California produces many thousand tons of apricots a year. There are a number of factories in that state devoted to drying and canning apricots. In one year the United States exported more than 35,000,000 pounds of dried apricots, which were shipped to all parts of the world. The fancy trade of this country, however, still demands the importation of a small amount of dried and candied apricots from France and from Italy.

Oranges. There are two kinds of oranges—the bitter and the sweet. The bitter orange, known as both the Seville and the Bigarade orange, was the first orange known and was brought by the Moors to Spain in the eighth century. Not until the fifteenth century did Europe become acquainted with the sweet orange. Both the bitter and the sweet oranges were introduced into Florida, where they thrived wonderfully. But, because the sweet oranges were much preferred by the American people, practically no bitter oranges are now grown in this country. While oranges will grow in many of our southern states, they thrive best in Florida and California, where many millions are raised each year. Although we still import oranges from Europe, Asia, and Central America, our exports of oranges greatly exceed our imports.

There are several varieties of fancy sweet oranges, of which the Satsuma, the tangerine, the mandarin, navel, Valencia, St. Michael, and the King of Siam are the most familiar. The kumquat is a tiny orange, the size of a small plum and generally oval in shape, which we have imported from Japan. The Japanese and Chinese in our country are now cultivating it. The fruit is acid with a sweet rind usually eaten with the pulp. This fruit has met with great favor in Europe and is also much appreciated in this

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One of the great orange groves in southern California. More than ten thousand acres are here planted to navel oranges

country. The preserved or candied kumquat is excellent and is a favorite sweetmeat of the Chinese.

Lemons and limes. The lemon is so familiar a fruit that it has achieved a permanent place in the

Courtesy of U. S. Dept. Agr.

Washing lemons by machinery. Lemons are usually picked once a month. They are then washed, sorted according to color, and the unripe and partly ripe fruit stored to color and mature

slang of our country. While we produce a great quantity of lemons, we still import many from Europe. The lemon, like the pear, is best picked when green and allowed to ripen off the tree.

The lime, a member of the lemon family, is much smaller than our lemon. It grows best in the West Indies and India, but a limited supply is grown in the United States and in Europe. The lime is growing in popularity and its use in place of the lemon is steadily increasing in this country. Limes are so aromatic they almost seem to have been perfumed.

The ginep, or Spanish lime, is a fruit which looks like a plum but tastes like a grape. Both the flesh

and seeds of this fruit are eaten, the latter sometimes being roasted and eaten as we eat nuts.

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Gathering limes in the West Indies

The grapefruit or pomelo. The grapefruit is the largest member of the citrus family as the kumquat is the smallest. The orange, lemon, kumquat, lime, citron, citrange, and grapefruit all belong to the citrus family. The grapefruit, also known as the pomelo, is said to have been introduced into Florida

by the Spanish. It is called grapefruit because it hangs from the tree in clusters as grapes hang from the vine. We get this fruit chiefly from California, Florida, and the West Indies. Porto Rico sends us annually increasing quantities of it.

Other citrous fruits. There is also a fruit known as the Bengal quince or the elephant apple which is said to be of the citrus family. Another fruit probably of the citrus family is the bergamot of Southern Europe, a somewhat pear-shaped fruit which seems to be a cross between a lemon and an orange.

The citron, another member of the citrus family, is said to be a native of the island of Corsica, the birthplace of Napoleon Bonaparte.

Olives, green and ripe. No doubt all of us have tasted pickled olives, and perhaps some of us have eaten ripe olives. Then, too, olive oil is doubtless familiar to you. But do you know how the olive grows, where it comes from, and what is its history? This question becomes an interesting and important one when we remember that we sometimes import more than 5,000,000 gallons of olives in a single year and more than 6,000,000 gallons of olive oil in the same time.

You are all familiar with the green olives which come in bottles, either plain or stuffed with peppers or anchovies, and packed in brine. In Southern Spain, where the finest green olives are produced, the fruit for pickling sometimes grows as large as plums. Ripe olives are of a dark brown color. Their use is becoming more common in this country every year. In fact, on the Pacific coast where the olive is grown, few green olives are used, the ripe ones being much preferred.

The Bible speaks often of olives, as does ancient history. It is doubtful if there are many fruits

An olive orchard near Fresno, California. This state produces the largest part of the olives raised in the United States

that have been known to man longer than the olive. Originally the olive came from Asia Minor, but it is now raised extensively in our Southwestern States and in all the countries of Europe bordering the Mediterranean. The olive grows on a large evergreen tree which bears a heavy mass of greenish-gray leaves. It thrives best in a dry, subtropical region. The trees sometimes reach the age of fifteen hundred years. It is claimed that certain olive trees in France are two thousand years old.

Two kinds of persimmons. The United States and Japan both produce persimmons. A young lad in far off Japan picks, from a small tree, a sweet, juicy

persimmon, the size of a large peach; while the lad in our Southern States scales a tall tree, perhaps fifty feet high, to get a persimmon the size of a small plum. Both of these persimmons, however, when thoroughly ripe are as sweet as sugar-plums, and are keenly appreciated by the boys who gather them.

The pomegranate. The pomegranate, which is now cultivated quite extensively in Turkey, and in fact in nearly all other warm countries, is a native of Persia. The pomegranate tree has showy flowers of an orange-red color and bears a fruit about the size of a big apple, which has a reddish-yellow rind. This fruit is made into sirups and wines in Persia and its seeds are considered of medicinal value. The pomegranate is highly valued in the Levant. Perhaps it would be interesting to you to ask the

Courtesy of George C. Roeding

A pomegranate vender on the pontoon bridge that spans the Tigris River at Bagdad

elder members of your family if they can tell you something about the Levant and just where it is.

The fig and where it is grown. It will also afford you constant entertainment at home to start a guessing contest as to what countries grow each kind of fruit that is brought to your home. For example, what one fruit is raised chiefly in Smyrna, in Turkey, in Greece, in Dalmatia, in Italy, in California, Louisiana, and in Texas? The fig!

The history of the fig is as old as that of the apple. There are more than a hundred varieties of figs. In its natural state the fig is a small pear-shaped fruit with a tough skin, which varies in color from almost white to a dark purple. The fruit is eaten fresh, preserved in sirup, and dried. While the dried fig is the most popular form in this country, California

Irrigating a fig orchard in California. The fig industry is increasing steadily in importance in California and the South

is now putting up many gallons of figs in sirup each year. Although California, Louisiana, and Texas

raise large crops of figs, the United States still imports many million pounds of this fruit annually.

Courtesy of George C. Roeding

Fresh Calimyrna figs packed ready for shipment. These California figs are unsurpassed in quality

In one year we bought more than 13,000,000 pounds of figs from Asiatic Turkey alone and millions of pounds from Greece and Italy. We have also imported figs from Egypt and from French Africa.

An immigrant wasp and his work. No doubt you have at some time asked yourself the question, "Of what use are wasps?" Let me tell you about the fig wasp, without which we should not be able to have the fine variety of figs we get from Smyrna and from the vicinity of Fresno, California. The finest fig trees require "caprification"; that is, they must be visited by the wasp which carries the pollen of the capri fig into the blossom of the fruiting tree. If this wasp does not visit the fig tree it will not fruit

properly. How a plucky California horticulturist introduced this wonderful wasp into his fig orchard, at an expense of thousands of dollars, is one of the most interesting of all food "immigrant" stories.

Brown Bros.

Gathering fruit from a date palm in Arizona. Soil and climatic conditions in certain areas of Arizona and California are especially suited to the date and its cultivation is increasing

It made possible the production of figs of the finest qualities, and put the American fig industry on a permanent commercial basis.

The date palm and the date. It is difficult to picture an oasis in the Sahara without at once seeing the tall, green-topped date palm. It would also be hard to imagine how the wandering tribesman, ranging

this great sea of drifting sand, could live were it not for the date palms which offer shelter and food to the traveler. It is not only a blessing in itself but in the heart of the desert it affords shade and protection so that figs, almonds, and other trees and vegetation will thrive there.

The date palm will flourish under conditions where nothing else would grow, yielding a life-giving food in the heart of a sun-baked desert of sand. It is almost the only tree or plant to which alkali is not injurious. In the "Sunken Gardens" of the Algerian Sahara grow the *Deglet Noor* dates, which are considered the choicest in the world. These trees appear to be half buried in the drifting sands. They are fed by an abundant supply of underground water.

Not only does the date palm furnish food to the natives of Persia, Arabia, and Northern Africa, but its wood and leaves are used by them in a variety of ways. It begins to bear when about six years of age and will continue to produce fruit until it is more than a hundred years old. In the arid Southwest of our own country there is an extensive and flourishing plantation of date palms.

United States merchants annually import almost 35,000,000 pounds of dates, of which nearly seven eighths are purchased from Asiatic Turkey. A large percentage of the dates from Smyrna are raised in Arabia. Dates are raised also in China, Spain, Mexico, Greece, the West Indies, and the East Indies.

The banana. The banana is undoubtedly the most productive fruit plant known. We cannot properly call the banana plant a tree, because it is cut down every year, growing up again from the roots or stump. You have seen the great bunches

of bananas hanging in stores, and in imagination you may have seen them growing on large trees.

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A banana plantation in Costa Rica. Although a native of the West Indies, the banana is now grown in almost all tropical countries

But more than likely your mental picture was not correct, for when growing the fruit points upwards, not downwards as you see them hanging in stores.

The banana is a native of the West Indies, but is now grown in almost all tropical countries. There are two special varieties, yellow and red. The

fruit is harvested, shipped, and marketed while green. In fact, the wholesale fruit houses always buy their bananas green and ripen them in banana rooms which are kept warm and dark.

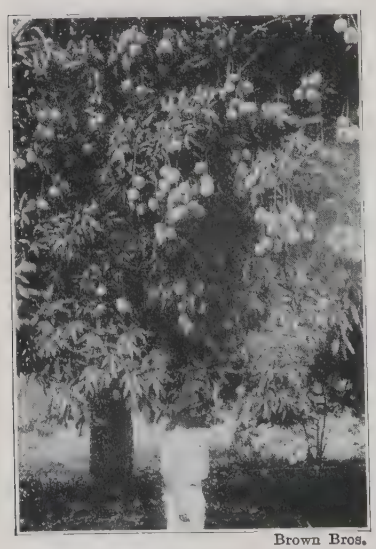
The carambola, an East India fruit. An East India fruit that will no doubt interest you is the carambola, also called the Coromandel gooseberry. This fruit is usually about the size of an egg and has a thin, smooth, yellow skin. It has a variety of flavors, from sweet to sour, and is a general favorite wherever found. It is eaten raw, cooked, or pickled.

The avocado or alligator pear. If you were to make a journey into Central America you would see there a fine spreading evergreen tree whose oval

The avocado or alligator pear is eaten chiefly as a salad, with salt, pepper, and vinegar

leaves shade its large, green, pear-shaped fruit. This is the avocado, or alligator pear tree, which grows

also in Florida and California. While the avocado is a fruit it is eaten chiefly as a salad, and is treated more like a cucumber than a fruit. It is peeled and eaten with salt, pepper, and vinegar, or served with salad dressing. The taste for alligator pears is usually acquired. Their popularity in this country, however, is shown by the fact that they often sell for seventy cents apiece. The avocado is not a very large fruit, averaging about a pound in weight. There is no other food, perhaps, which has been given such a variety of names. It is known, for example, as the maya and the "custard apple." Spanish, French, Aztec, English, Carib, German, and Latin all have had special names for it. In fact, it is called by forty-three different names in eight different languages.



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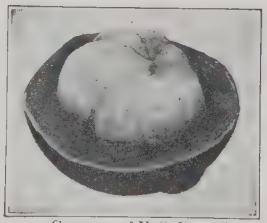
Gathering mangoes. Our supply comes from Mexico, the West Indies, and Florida

The mango. Perhaps the most widely discussed fruit of the tropics is the mango. Although it is said to be a native of Southern Europe, it is now grown in almost every tropical country in the world and is produced in many sizes, shapes, and colors. It is a delicately flavored fruit, soft and difficult to keep, but delicious when eaten like a cantaloupe.

Unlike the cantaloupe, however, it has a stone to be removed. The mango is a most popular fruit in the South, and in the larger cities of the North, where it is sold by high-class fruit houses.

The mangosteen. Among tropical fruits none is more interesting than the mangosteen. It is claimed by some to be the finest of all fruits. The mangosteen is not widely known because it will not stand transportation. It is a small fruit with a thick rind and a soft, rose-colored pulp. It is not only unsurpassed in taste but is said to be especially wholesome.



Courtesy of U. S. Dept. Agr.

A mangosteen cut open, showing the edible pulp surrounded by the thick rind

The sapodilla. Another tropical fruit is the sapodilla, which looks much like a russet apple and contains a soft, sweet pulp. It is eaten either raw or cooked.

Breadfruit and how it grows. Still another important tropical fruit is the breadfruit. If you were to go to Central America to gather breadfruit you would find great trees with peculiar fern-shaped leaves, below which hang bunches of large green fruit, bigger than your head. The breadfruit has a heavy rind, inside of which is a white starchy mass that looks very much like bread dough. But when this fruit is boiled, sliced, and served with butter, it is very good indeed, tasting not unlike sweet potato.

There is also a false breadfruit, or ceriman, as it is sometimes called. The ceriman is shaped like a large ear of corn, and when the husky skin is removed the fruit is delicious.

The guava and its uses. Just imagine now that you are traveling in the tropics—let us say in Mexico—and that you have found a guava tree. The fruit on this tree is possibly the size of a small tomato. It may, however, be larger or smaller, as there are about a hundred different varieties of this fruit found in tropical America. It may be red and shaped like an apple or it may be yellow and shaped like a pear. Like many other fruits, it may be eaten raw, cooked, preserved, or made into an excellent jelly. This fruit is seldom eaten in its fresh state in temperate climates, because, like many other delicious tropical fruits, it cannot be transported long distances.

Other fruits of tropical America. While you linger, in imagination, in tropical America you might also taste the fruits of the Spanish bayonet, the sweet sop, the sour sop, the cashew apple, the pepino, and the cherimoya. There also you would find the true papia or papaya, which is often confused with our pawpaw. The tropical papia looks something like a muskmelon, while the pawpaw of the United States outwardly resembles a short, thick banana.

The plantain. In many tropical countries, the plantain, a fruit which tastes like a vegetable, serves as a food staple, taking the place of grains and root vegetables. It belongs to the banana family, but it is flat, and much larger and coarser than the banana. The plantain has little flavor, and is seldom eaten raw. When roasted or baked, it is considered appetizing and nutritious. The plantain is also dried and ground into a flour which serves many food purposes.

The prickly pear and other cactus fruits. You should be careful not to confuse the prickly pear

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A field of prickly pear or spineless cactus in the fruiting season. The finer grades of fruit afford an excellent article of food and the coarser provide fine food for cattle

with the avocado, to which it is in no way related. The prickly pear is the fruit of the Opuntia family, one of the cacti. The fruit, except that of the spineless variety, is usually armed with many tiny thorns or spears. This fruit is eaten in much the same manner as the avocado. The fruit is of various colors—red, yellow, purple, and green. In Mexico and Sicily, the poor people look upon the prickly pear with great respect, as it forms an important part of their food supply and is used in many different ways—as fruit, as salad, and as jelly. The juice of the prickly pear is made into a pleasing drink.

Other fruits belonging to the cactus family are

the Mexican strawberry, the strawberry pear, the Barbados gooseberry, and the melon thistle.

The Mexican strawberry is a small fruit about two inches long and one inch in diameter, of a reddish-yellow color, and is the fruit of the hedgehog cactus.

The taste of a strawberry pear might lead you to think that you were eating a strawberry, although it is not as delicate in flavor as the strawberry and is perhaps a trifle sourer. It is bright red in color and shaped something like a pear. The strawberry pear is the fruit of the torch cactus, which takes its name from its long, brilliantly colored flowers.

If you saw Barbados gooseberries hanging from a certain cactus found in the West Indies you would probably think them misplaced gooseberries, so much do they resemble that fruit in appearance. Although their flavor is distinctly different from that of our gooseberry, if you tasted them you would not be disappointed.

The fruit of another cactus plant, the melon thistle, looks much like one of our favorite melons. This fruit, small and pearlike in shape, resembles a musk-melon and has a delightful flavor. The plant in some cases attains a height of two feet.

In the future when you hear some one speak of the cactus you will think not alone of the huge, thorny, spike-covered stumps rearing their grotesque shapes above the hot sand of the desert, but of various plants, trees, shrubs, and vines, which furnish both man and beast with pleasing food.

The pineapple. Suppose we now turn our attention to fruits which grow on bushes, shrubs, and vines.

The pineapple, one of the finest of this class of fruits, is a native of tropical South America, but is

now grown in many tropical countries, especially the islands of the Caribbean Sea. Pineapples are

Harvest time on a Hawaiian pineapple plantation. The pineapples from this island are considered the finest grown

also grown abundantly in Hawaii and in Florida, and are cultivated under glass in Northern Europe.

The pineapple was so named because its fruit looks very much like a pine cone. It is, however, the fruit of a low-growing plant, not of a tree. It grows in fields which, in some parts of Florida, contain thousands upon thousands of these delicious fruits. Perhaps the finest pineapples now grown are those on the plantations of Hawaii, where there are immense canning factories, which can the fruit and ship it to all parts of the world. The fresh pineapples you see in your grocery store are likely from Florida, Cuba, or the Bahamas, as it is very difficult

to ship successfully the fresh fruit from the Hawaiian Islands.

Grapes and where they grow. In the hillside vineyards of Italy, Germany, and France one may see, at almost any point, the peasants working among the vines—a charming picture of contentment. A parallel to this picture may be seen in the "grape belt" of western New York. New Jersey, Ohio, Michigan, and Missouri also are dotted with prosperous vineyards. California has the largest commercial vineyards in the world, where grapes are raised for the table, for making wine, and for raisins. Here may be found great vines each bearing thousands of pounds of grapes in a single season. One vine in California is said to produce thirty thousand pounds of grapes a year. Can you imagine that? Thirty thousand pounds of grapes from one vine, growing from a single root! The writer has seen two thousand acres of vineyard in one "block" flourishing on what appeared to be a desert of sand.

Since thousands of American and European farms have their private vineyards and many states can boast of their commercial vineyards, it is impossible to form any idea of the quantity of grapes consumed each year. It means millions of pounds of fresh fruit, millions of gallons of grape juice and wine, and millions of pounds of raisins. Quite recently California sent a whole trainload—fifty cars—of raisins to Chicago wholesalers.

Grapes are of many varieties and many sizes and many colors. The best known American grapes are the Concords, the Niagaras, the Delawares, and the Catawbas. The big Malaga, possibly the best known table grape in the world, is grown most

extensively in Spain. Another fine Spanish grape is the Almerias.

Importance of the grape industry. It is almost impossible to say how much land is planted to grapes.

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A Tyrolese farmer taking a load of grapes to the press to be made into wine

In California alone there are more than 250,000 acres of land devoted to grape culture. In practically every country of Southern Europe the cultivation of grapes is an important industry. In addition to the fruit secured from the thousands of acres of vineyards in California, New York, Michigan, Ohio, and many other states, we use more than 1,000,000 pounds of Spanish grapes each year, and also import grapes from some of the other European countries.

Wines and champagnes are made from grapes, as are also many other beverages. Wine making

is one of the greatest industries of the world. France, Germany, Spain, and Italy look to it as

Strawberries. New varieties and increased means of transportation make this fruit possible the year round

one of their chief sources of income. Ordinarily we import about 6,000,000 gallons of wine a year.

Berries. The small fruits which grow on vines and bushes are usually known as berries. The most common of these with which you are no doubt all familiar are the strawberry, the blueberry, the raspberry, the currant, the gooseberry, the huckleberry, the cranberry, and the blackberry.

A cranberry bog. Perhaps the only one of the small fruits that you have not seen growing is the cranberry, and so suppose we see just what a cranberry bog or farm is like. A cranberry farm is usually situated in a natural bog or marsh, although in some cases lowlands are artificially flooded and made into bogs for this purpose. Cranberries grow

on vines which require a great deal of moisture. They are often protected from the frost by being covered with water. This is done by flooding the ground from ditches which are usually built through the bogs.

It requires three years after planting for a cranberry bog to bear fruit, at which time countless little red berries appear on the vines. In nearly all the larger bogs the berries are gathered by the aid of stripping forks, but in the smaller ones they are stripped from the vines with the fingers so that the fruit may not be damaged. During the harvest season in a cranberry country nearly every able-bodied person, including women and children, go into the fields to gather the berries. The harvesting must be done rapidly as a frost will seriously injure the berries. After the cranberries are gathered they are put through a winnowing machine which

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Pickers at work in a cranberry bog. The fruit was first cultivated on Cape Cod, and Massachusetts still leads in its production

separates the dirt, leaves, and grass from the fruit. They are then barreled and shipped to market.

Cranberries were first raised in this country in Massachusetts, which still leads in their production. The cranberry industry has been developed in New Jersey, New York, Wisconsin, Washington, Oregon, and Minnesota. Cranberries are raised in Europe, but their quality is not so good as those produced here, and our cranberries find a ready market in the Old World countries.

Australia produces a berry similar to our cranberry in both taste and appearance. This is the roselle, which has recently been introduced into this country, and of which we may expect to see more in the future. The roselle is served in a manner similar to the cranberry and, like it, makes excellent jelly.

The melon family. The watermelon, one of our most familiar summer fruits, is a native of Africa. No doubt you have eaten the rich red flesh of the watermelon, and enjoyed it, too. While the watermelons generally seen in our city markets are red-fleshed, there are melons which have a bright yellow flesh, but are characterized by the same delightful flavor as the red-fleshed watermelon. The flesh of the melon is always eaten raw, but the rind makes an excellent preserve or pickle. The watermelon grows on a very large vine and is as common to the southerner as the potato is to the boy of the North.

The citron melon is the same in color and shape as the watermelon but is much smaller, and cannot be eaten raw. It is used for pickling and preserving.

The muskmelon family includes a variety of small melons, of which the cantaloupe, osage, and nutmeg are possibly the best known. Some of these melons

are as small as a large orange, while others are as large as your head. Their flesh is of different colors,

A watermelon patch in California. Sometimes, as in this patch, melons are grown between rows of orchard trees

ranging from a pale green to a deep salmon pink. The muskmelon is grown in almost every state in the Union and is consumed only in its fresh state.

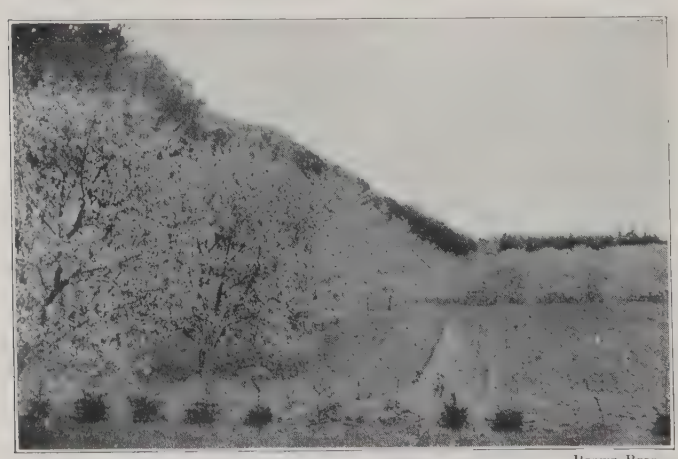
California also grows a large green-fleshed melon for winter consumption in this country. Melons of this variety sometimes weigh as much as ten pounds each.

Melons from abroad. During the winter months we import fancy melons from other countries. Among these is the golden or Egyptian melon from Egypt. It is shaped like an enormous cucumber, a single melon sometimes weighing twenty pounds. It has rind and flesh something like those of the Rockyford cantaloupe.

The melon we import from France is broader and shorter than the Egyptian melon and weighs about six pounds. There is grown in France a tiny, seedless green melon not much larger than a walnut, which is known as the melon d'Orpagon. This is pickled and is a favorite in Europe.

Another melon known as the pomegranate melon is about the size of an orange and has a green mottled rind and pink flesh.

The English Queen melon is grown under glass in England. It is netted and has yellow skin and flesh. This melon will weigh from three to seven pounds.



A fruit farm along the Niagara River Brown Bros.

Fruit as a food for man. Fruit has been one of man's main sources of food supply since the world began. Primitive man, of the temperate or the torrid zone, whether his home was in America, Asia, Africa, Europe, or one of the thousands of islands that dot the oceans, always depended largely upon

wild fruits for his food. Civilized man has come to realize the importance of this gift of nature and has given much time and thought to the cultivation and the higher development of the various fruits with which he is blessed.

Evolution of modern fruits. The colonists of Virginia learned from the Indians the value of wild mulberries, crabapples, and huckleberries. The red men also taught the settlers the value of the wild foods of the fields and woods. As we look upon a plate of luscious pears, apples, melons, grapes, and peaches it is difficult to realize that these are the descendants of tiny, sour, hard-skinned, and almost unpalatable fruits. But this is unquestionably true. Nearly every fruit we eat has been developed by man until it requires a great stretch of the imagination to associate the present product with its parent of long ago.

Mr. Luther Burbank, a man who has done many wonderful things in fruit culture, has given the world more than a hundred new varieties of fruits and berries. He has done this by selection and "crossing." If you could see the original thorny, forbidding-looking cactus from which Mr. Burbank has developed a delicious and healthful food which is good for both man and beast, you would think the achievement wonderful.

Increased use of fruits. Primitive man of necessity made fruit a large part of his daily food; civilized man has it on his table every day because of its delicious flavor and its actual food value. There is a common recognition of the wholesomeness of fruits in the fact that they are generally given to invalids and convalescents. There can be little

doubt that the use of fresh fruits is increasing rapidly and that each year a higher percentage of man's diet consists of fruits. Besides the tremendous quantity of fruit that is eaten fresh every year, there are millions of pounds preserved and put up in glasses, jars, and cans. It is doubtful if there is any part of the world to which some of the canned fruits of our country are not sent. Then, too, each year many million bushels of fruit are dried. It is impossible, also, to estimate the number of carloads of fruits which are made into ciders and cordials every year.

Chapter VII

VEGETABLES AND THEIR SEEDS

An everyday food. Some good and highly important things are so common we are inclined to forget their existence. To this class belong vegetables.

Probably they appear on your table at least twice each day and sometimes as many as four or five different varieties are placed before you at a single

Choice specimens of common foods. Vegetables and fruits selected for exhibition at a county fair

meal. If you were to make a careful search through the drawers and shelves of your home kitchen, pantry, and cellar, you would probably find a surprising variety of fresh, canned, and dried vegetables.

Variety and supply of vegetables. Perhaps it might seem to you that vegetables are uninteresting

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Harvesting onions. The raising of vegetables on so extensive a scale as this has made possible the variety and abundance on the average table of to-day

articles of food and that there has probably been little change in this branch of our food supply since the time cooks first began to conjure with stew-pans. But such a conclusion would be decidedly wrong. In comparatively recent years there have been wonderful changes, not only in our use of vegetables but also in the variety and abundance of our supply. When your father was a boy, he did not have the large assortment of vegetables you now enjoy, and your grandfather as a boy probably had no more than six or eight kinds on his table from one season to another.

It is almost impossible to name all the vegetables which one may buy in an up-to-date grocery or market to-day. Those vegetables which we all

know and many of us no doubt have seen growing, are: artichokes, asparagus, beans, beets, cabbages, carrots, cauliflower, celery, corn, cucumbers, lettuce, onions, parsley, parsnips, peas, potatoes, pumpkins, radishes, rhubarb, squash, sweet potatoes, and tomatoes.

Vegetable families. It is interesting to consider vegetables in families. For example, the Brussels sprouts, broccoli, borecole, and collard are all members of the cabbage family. In the same way

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Gathering eggplant for market. This vegetable, which is a member of the same family as the tomato and potato, is a growing favorite with market gardeners

nearly all other vegetables have a great many brothers and cousins that are called by different names. One

of these families may include a number of vegetables that differ widely, both in taste and in appearance. There are the eggplant, the potato, and the tomato all belonging to the same family, yet they do not look, taste, smell, or grow alike. Would you imagine the tomato and the potato to be related, or the turnip-like kohl-rabi to be of the cabbage family? Such, however, is the case.

Interesting members of the bean family. The bean growing in your garden is of the same family as the curious tamarind of the East Indies. The tamarind grows on a big tree sometimes reaching forty feet in height, from which it hangs in long, thin-shelled pods that ripen in July and contain a sweet pulp and large, flat seeds. These seeds are the beans. But in the case of the tamarind the pod instead of the bean or seed is eaten. Or perhaps it is more accurate to say that the pulp surrounding the seed is the part that is used for food. This pulp is put into kegs and covered with boiling sirup, and is then shipped to various foreign markets. Later it is repacked in glasses or stone jars and sold, being considered a choice delicacy.

The cowpea or "field pea" of the South, and the soy bean, a native of Asia, also belong to this family.

New uses for the soy bean. One member of the bean family, the soy bean, which has been used in this country for many years but for fodder only, is now being recognized as one of the greatest of all vegetable foods. It is highly valued in the Orient both as a substitute for meat and as a relish. It also makes good soup stock and in Japan, China, India, and other parts of Asia is used in fermented form and is made into cheese, sauces, and drinks.

In some European countries its value as a food for invalids with impaired digestion is recognized and

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Soy beans ready for shipment in Manchuria. The soy bean, which until recently has been used in this country for fodder only, is highly valued in the Orient as a substitute for meat and as a relish

in Paris one may buy soy bean bread and soy bean meal. From the standpoint of food value the soy bean may be classed with meat, as it contains a large percentage of protein and a good percentage of fat.

The soy bean grows from seed each year, just as our common beans do, and the plants are about the same size as our bush beans. The leaves of the plant are hairy, as are also the pods, which contain about four beans or seeds. The flowers are lilac colored.

Less familiar vegetables. There are a large number of vegetables unfamiliar to many of us, which may be bought in the markets of the larger cities of this country. Some of these are decidedly interesting.

Bamboo as a vegetable. Surprising as it may seem, one of the most delicious vegetables used in great quantities in the Orient and now being introduced into this country is the young bamboo shoot. Is it hard to imagine relishing the plant from which your fishing poles are cut? Yet the Chinese consider the tiny shoots of the bamboo a delicacy and use them largely in their chop suey. In many respects the bamboo is not unlike asparagus.

Vegetables for greens. The borage is a garden herb, the young leaves of which are used for salads and cooked as greens. Some of the finest greens are the leaves of the detested dandelion and mustard, of the beet, the turnip, the spinach, the kale, and Swiss chard. Sorrel, and many common weeds, such as the milkweed, the cowslip, the "pigweed," and the purslane, are used as greens.

Vegetables used in salads. The cardoon is a plant of the thistle family useful for its stems and midribs. It is used in salads and soups and in the same ways as asparagus. The cardoon resembles the artichoke, although it is larger. It sometimes grows as high as ten feet and has leaves three feet in length. As we do not raise enough of this vegetable to meet the demand, we are compelled to import it from France.

The rampion is a plant that looks something like the turnip, its leaves and white roots being used for salads. The shape of its root, however, is like that of the carrot.

The shallot is a member of the onion family, with a flavor stronger than that of our common onion. It is used chiefly for sauces. salads, and soups. The shallot is pear-shaped, a little larger than a walnut,

and grows in clusters. The leek is also of the onion family, but, unlike the shallot, it is mild in flavor.

Trimming and bunching asparagus for shipping. As a salad asparagus, a close competitor of the early pea for public favor, is now widely used and is constantly growing in popularity

The endive, which with its relative, the dandelion, belongs to the chicory family, is considered about the finest of all salad plants. It is now cultivated in nearly all parts of the world. The endive was originally introduced into Europe from China and into America from Europe. This country raises a large supply of endive, but we still find it necessary to import thousands of dollars' worth of it yearly from Europe, especially from France. There are several firms in this country whose principal business is to import and distribute endive. These firms usually maintain men in Europe to

locate the choicest supplies. Belgium has been the greatest producer of the endive.

The chufas of Southern Europe. Chufas, also known as earth-nuts, are native to Southern Europe. These tuberous roots, which are about the size of beans, are very nutritious and are eaten both fresh and dried.

The gherkin and the martynia. The gherkin is of the cucumber family and is a native of Jamaica. It is also known as the Jamaica cucumber and is considered especially excellent when pickled or boiled.

The martynia, or unicorn plant, is also pickled and eaten like the cucumber. It resembles a small violet-colored gourd and grows on a vine like the cucumber.

Tomatoes of many kinds. The ground cherry, musk tomato, strawberry tomato, or winter cherry grows wild in the Mississippi Valley and in other parts of the world, but it is now cultivated quite extensively in this country. A member of the tomato family, it is known as the blue tomato by truck gardeners. It grows in a small husk which if left on will preserve the tomato through the winter. Although this tiny vegetable, which is only a little larger than a small cherry, may be eaten raw, it is at its best when preserved.

This is only one of the fifty-odd varieties of tomatoes. There are red tomatoes, white tomatoes, blue tomatoes, and yellow tomatoes of every imaginable size and shape. There are tomatoes that, because of their shapes, are known as the pear tomato, the peach tomato, the cherry tomato, the plum tomato, the grape tomato, and the currant tomato.

Origin and use of tomatoes. The tomato has an interesting history. Botanists generally agree

Delivering tomatoes at the canning factory

that it first grew in South America. It was probably cultivated in Mexico and Peru many years before the appearance of the Spaniards in 1519. For a long time this vegetable, now appreciated in every country in the world, was considered poisonous. To-day canned tomatoes are by far the most widely used of all canned vegetables. In addition to those canned in the home, the United States alone puts up more than 500,000,000 cans in a year, for commercial use, besides those that are preserved and made into ketchups, sauces, and salads. It would be impossible to determine the enormous quantity of fresh tomatoes consumed in this country in a year. The people of the United States are the largest per capita consumers of tomatoes in the

world. With the possible exception of Italy, no other nation appreciates this delicious vegetable as it deserves.

An ancient member of the pea family. You have no doubt read the story of Esau and how he sold his birthright for a mess of pottage. That pottage was very likely made of lentils. Lentils are as old as history, yet they are not a common food in this country. They are of the pea family and are about the size of a pea, but flat and circular in shape. They resemble the pea in flavor and are used in much the same ways, in soups, stews, and as a vegetable. In Germany they compete closely in public favor with the pea. The Germans use great quantities both of lentil meal and flour and of pea meal and flour. The lentil of commerce at the present time is largely from Egypt.

A member of the squash family. Vegetable marrow is a member of the squash family and is closely related to our summer squashes. It is usually white or pale yellow in color and resembles a large ripe cucumber, although usually much thicker. It commonly reaches a length of about ten inches, although the Italian variety, which has a very rough, green rind and pink flesh, sometimes grows to twice that size. This vegetable is gaining in popularity in this country, and gardens in which it was unknown a few years ago are now producing it abundantly to meet a steadily increasing demand.

Two well-known root crops. The yam is not the sweet potato although it both looks and tastes like it. It is a native of tropical America, and, like the sweet potato, is the tuberous root of a climbing plant. Neither the yam nor the sweet potato is

related to the ordinary or "Irish" potato, which is a member of the nightshade family.

Salsify or vegetable oyster is so called because when cooked its flavor is very much like that of the oyster. Its roots resemble those of the rampion and the white carrots and are chiefly used for soups.

Tapioca. One of the widely known foods of commerce is tapioca, which is also known as the

Manioc roots. The manioc root, from which tapioca is made, is now being grown in Florida and other southern states

cassava, ubi tanah, and manioc. It is made from the roots of the manioc plant. The native home of manioc is Brazil, but it is produced in a limited way in Porto Rico, Jamaica, and on Trinidad. But on account of the cheap labor in the Far East, its cultivation was begun there and has developed until now the greater part of the world's supply of tapioca comes from the Straits Settlements and Japan. The roots of the manioc plant range in size from a diameter of one and one half inches to eight inches, and from eighteen inches to four feet in length, each growing one or more tubers. These

tubers grow in clusters somewhat like potatoes. A single tuber sometimes weighs as much as twenty-five pounds.

After the roots have been thoroughly washed they are conveyed to the grinder, into which a steady stream of clear water is flowing. As the roots are crushed they are washed into pipes which carry the pulp to sieves. These separate the pure tapioca from the fiber of the root.

It is next placed in shallow vats where the starch from which the tapioca is made, is allowed to settle. The water is then drawn off and the starch is broken into small pieces and cooked in iron basins.

This manioc root from which tapioca is made is an important native food in several tropical countries. In South America a meal obtained by drying and grating the root is baked in thin cakes. These cakes are nutritious as well as pleasing in taste.

New varieties increase use of vegetables. From this study of vegetables you will have learned that each year new vegetables are being added to those long for sale in our markets. You will realize, too, that this branch of our food supply is constantly changing and enlarging. We are reaching out here and there and adopting the vegetables which have found favor in other countries. At the same time it is well to remember that we rarely ever discard a vegetable after it has once come into common use. We hold fast to the use of all those which have been found nourishing and agreeable. This means a constantly increasing variety — an important consideration, in view of the fact that vegetables are as a rule cheaper than meat and that there is a

growing class of persons who are inclined to eat less meat and more vegetables.

Canning widens choice. Of still greater importance is the fact that improved processes in canning have immensely increased the world's consumption of vegetables and multiplied the choice of vegetables open to any consumer. In a word, there is scarcely

Prize tomatoes and sweet corn. These two vegetables rank high among those that are most successfully canned

a vegetable commonly grown which you cannot buy in canned form anywhere in the world. While there are undoubted exceptions to be taken to this statement if applied in a literal form, the fact remains that it is substantially true. Fortunately the most nourishing vegetables—such as tomatoes, peas, sweet corn, and beans—are those most successfully canned and for this reason they are usually to be had at low cost.

Vegetable supply an unknown quantity. There is no practicable way of discovering how many

A great commercial truck garden. Here from left to right may be seen long rows of beets, celery, onions, and carrots

million tons of vegetables are eaten every year by the people of this or other countries, or how many billions of dollars this vast volume of food is worth. The "trucking" or vegetable-raising industry in America is an immense one. In the country districts the home vegetable garden is almost universal, and the farm or village home without its own garden patch is the exception. The vast total of this production is unknown and practically beyond computation.

European seeds carefully grown. The importance of the vegetable crop in the work of feeding the world is shown in the care and skill employed in Europe in growing vegetable seeds. In one of Germany's

foremost seed gardens, at Erfurt, is a flower bed bordered with a fringe of parsley which attracts the attention of every observing visitor. This parsley is curlier, more compact in growth, and more dwarfed than any parsley produced in America. When questioned, the superintendent of the garden confessed that, five years before, he had started out with a definite ideal of a perfect parsley in mind and ever since had been constantly working toward its realization.

"It's beautiful—wonderful!" exclaimed his visitor. "You have certainly met with remarkable success. Would you permit me to take a photograph of this parsley for the benefit of the American public?"

"No!" was the firm answer. "I am sorry to refuse, but this product is not yet ready for the public. You will notice that occasionally throughout the row there are plants not as curly as the others; they are taller, rangier, and less compact. This defect must be so thoroughly overcome that we may be sure there is little or no danger of its reappearance before we are ready to give this parsley to the world, or even to have it made public through the papers. We cannot allow any new strain or variety to go out from this establishment, even in an experimental way, before we have done all that is possible for us to do for it, or before we are fully satisfied with the results of our work. Come back in about five years and you may get the picture of this."

Another illustration of the untiring and painstaking persistence of the European seed growers may be seen in the way they grow radish seeds. As almost every home garden patch in America, no

matter how small, contains radishes, this illustration will interest a large number of us.

In European seed gardens, the seeds are thinly drilled into a carefully prepared soil bed. As soon as the roots reach a size at which their final shape, color, and quality may be safely judged, they are pulled up by men familiar with the characteristics of each of the fifty or more varieties of radishes now under cultivation. These men have clearly in

Harvesting lettuce seed in California. In this state many acres are devoted to the growing of garden seeds

mind the ideal at which the master gardener is aiming with each particular type in hand. Often they have had from ten to thirty years' experience in the production of radish seeds, working all the time in the same gardens and for the same employers.

The poorly shaped, undersized roots are discarded and those measuring up fairly to the ideal in mind are replanted, this time with space enough for each root to permit its perfect development. From this time until the seeds are harvested each plant is given individual cultivation and protection. This

method is followed by every first-class European seed garden.

Growing sugar-beet seeds. The painstaking and scientific practice which characterizes seed production in the representative establishments of Europe is still more vividly illustrated by the manner in which sugar-beet seeds are grown in the great European breeding gardens. The seeds are drilled in big, carefully prepared fields. Here the treatment of the roots is practically the same as that given to radishes. At the time of transplanting, experts select about one per cent for seed production.

From this one per cent the chief expert of the establishment selects about 10 per cent for the production of "stock seed." For example, it is not unusual for a field devoted to an important variety of sugar beet to contain 250,000 roots. At the first sorting 2,500 of the choicest specimens are selected. These are all critically examined by the chief expert, the head of the breeding work of the establishment, who picks from the 2,500 roots 250 that are destined to carry on the line of breeding. These aristocratic roots, it will be remembered, represent only one tenth of one per cent of the crop. After they have been approved by the eye of the head breeding expert their probation is by no means finished.

Next they undergo what is called the chemical test. Each root is bored and from it is taken a core of the pulp about one half inch in diameter and some three inches long. The root is numbered and the pulp from it is put into a glass tube bearing the same number. In the laboratory these pulp samples are subjected to analysis. Only those roots whose samples show a satisfactory chemical content

are selected to perpetuate the choicest blood of the line.

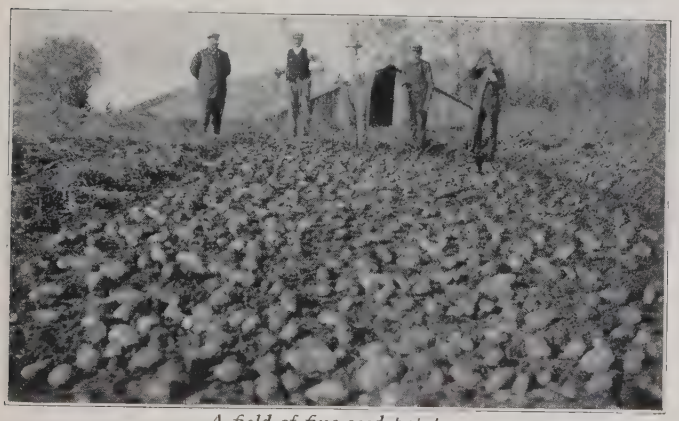
The remainder of the 2,500 roots, after the 250 champions have been selected, are replanted to furnish the commercial seed crop.

The following spring the roots that have qualified under all tests as champions are set out in a specially prepared piece of ground where each root is allowed two square yards of earth for elbow room. The care of these stock roots is a responsibility entrusted only to most dependable experts. They are sprayed, fed, and pampered as if each were the particular pet of the owners. After the roots have sent up their slender seed stalks, the labor of protecting them against cross fertilization by undesirable agents, and against insects, wind, and frost begins. For a time this was a difficult problem, but eventually a small circular tent was invented which completely surrounds plant and seed stalk. This is so constructed that only a moment's work is required to put it into place or to remove it.

How England obtains seeds. When the traveler through Southern England sees, on every hand, miles of cabbage, turnip, pea, radish, beet, and flower fields, all for seed production, it is hard for him to believe that England buys immense quantities of choice seeds from other countries and resells them. Perhaps peas are the choicest product of these fields, for English peas are the greenest grown under the sun.

Seeds grown on a large scale in France. In France, there are thousands of independent seed growers, many of them working on a small scale with a little patch of ground. Nothing shows so

clearly the perfection of seed production in Europe as does a glimpse of the great seed establishment at



A field of fine seed potatoes

Verrières, about thirty miles from Paris. Here the visitor finds four hundred acres devoted exclusively to the growing of seeds under intensive cultivation. The owners also control more than ten thousand acres in seeds in the south of France. This area is largely devoted to beets, sugar beets, mangel-wurzels, celery, onions of the foreign types, radishes, and herbs. In fact, the south of France may be compared with the north of Holland as a seed-producing district especially favored by climate and soil.

The world's international garden patch. North Holland, bounded on three sides by the Zuider Zee, is one vast "sunken garden" devoted to the raising of seeds. Here is the home of the famous Dutch bulbs, tulips, hyacinths, and all their brilliant kindred. But since the first half of the seventeenth century, the days of the great tulip craze, Holland

seed growers have turned their plodding genius to growing vegetable seeds, the demand for which is the solid one of food value instead of the fickle whim of flower fanciers. This does not mean that Holland has abandoned the growing of flower seeds and bulbs. Indeed not, for if you are in need of twenty tons of nasturtium seed, a single Holland grower can fill your order for that amount. But it does mean that the growers in the dike-protected fields are furnishing a big percentage of the world's best cabbage, cauliflower, kale, turnip, spinach, and radish seeds, as well as European beans and peas. There is not a European vegetable that cannot be grown, for seed purposes, to great advantage in the land of the wooden shoes.

Success due to people, not soil. Gazing upon the great seed gardens of Holland the stranger is likely to exclaim: "Nature has been good to Holland. What wonderful soil she must have to produce such astonishing crops!" She has, but here, again, the secret of her success is the character of her people, not of her soil. "Dutch thoroughness" and "Dutch patience" are not idle phrases. They are the solid foundations upon which the remarkable seed business of this world-loved little country rests.

Knowledge of seeds an inheritance. It is possible to find many instances where one acre of a Holland seed garden returns a larger revenue than is often brought in by an American farm of one hundred and sixty acres that is considered well cultivated. Intensive cultivation is an inherited art with the Holland seed grower. It is hardly an exaggeration to say that the average Dutch seed gardener inherits truer instincts for the business of raising seed than

the average American is able to gain by years of careful study. The same may be said for the Frenchman or the German who comes of a line of seed growers. In France, as in Holland, the lore of seed gardening has been handed down from father to son, from mother to daughter, through successive generations. This knowledge, in fact, is the richest legacy the seed gardener is able to leave his son or his daughter.

Seed growing in the United States. What has been done by European horticulturists can be done in our own fertile country. For every acre of Dutch land ideally equipped for seed production, America has a hundred equally favored.

The coming of the great European war naturally forced the horticulturists of the United States to grow many more vegetable seeds than ever before. This proved a big task, but it has been done with marked success and with true American energy and resourcefulness. In this work the seed specialists from the Old World have been decidedly helpful. This does not mean, however, that we depend wholly upon alien experts for the growing of our seeds. At first the seed gardeners grew vegetables for market because that seemed to be the most profitable thing to do, but the acute pressure for a far greater production of American-grown seeds virtually forced them to take a hand in seed culture. This illustrates how our country with its wonderful mixture of Old World peoples is generally able to meet any great emergency and produce the needful supply of articles previously imported.

Chapter VIII

MILK AND BUTTER

Milk, the perfect food. Every human being has at one time lived wholly on milk! This proves beyond question that milk contains all the food elements required to sustain life and promote growth. But as the human being develops, the upbuilding of his body demands other foods. Here begins the insistent call for variety in our nourishment that has made man explore the whole world for things to eat.

In America, when we speak of milk we usually refer to the milk of cows. But in other countries the people use the milk of goats, sheep, horses, reindeer, and other animals. In Europe the milk of sheep and goats is used extensively, not only in making cheese, but also as a part of the daily food.

The amount of milk consumed by man is almost beyond imagination. In the United States alone the trade in milk amounts to 7,500,000,000 gallons a year. This by no means represents all the milk we consume, because there are many thousands of gallons used by the owners of the cows, and the government in compiling these figures cannot take these unmeasured supplies into account.

Food properties in cow's milk. Cow's milk consists of about 85 per cent water and 15 per cent solids. These solids are composed of fat, casein, sugar, and albumin. There are also traces of salts of various kinds. The fat of milk, from which butter is made, is called butter fat. The casein is used for cheese.

Dairying and the cream separator. Dairy methods have greatly changed within recent years. Men

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A cream separator in a modern dairy. The invention of the separator has practically revolutionized the business of the dairy farmer

who are now barely in middle life can easily recall the time when all milk intended for butter making was put into pans in a dairy house and the thick yellow cream skimmed from the top and churned by hand on the farm. Later came the creamery, which sometimes made cheese as well as butter. The dairy farmer hauled his milk each day to the creamery, and perhaps hauled back to the farm, in the same cans in which he had delivered his sweet milk, a load

Dairy products. The rank of each state in value of cheese, butter, and condensed milk is shown by the figures

of buttermilk or whey for his calves and pigs. But this pastoral picture has been changed by the cream separator, one of the greatest of all modern inventions. It is especially valuable to the dairy farmer who lives too far from a town or city to sell his milk to those who use it in its natural state.

The cream separators, which may be operated either by hand or by power, resemble big brass bowls that whirl about with great rapidity. The centrifugal action resulting from the whirling sends the lighter cream to the top of the bowl while the heavier elements remain at the bottom. An outlet at the top permits the cream to escape, while a spout, nearer the bottom, drains off the skim milk.

The advantage of the separator to the farmer living a long distance from the creamery cannot be realized by one who has not seen a wagon heavily loaded with milk cans struggling through the mud and mire of a dirt road in the country after a spring thaw or a series of heavy rains. With the separator in his dairy house, the farmer remote from town or the creamery, instead of hauling hundreds of pounds of raw milk to market, takes one small can of cream. Then, instead of having to haul buttermilk or whey back to the farm for his calves and pigs he has a supply of sweet skim milk left at home for these animals. They relish this milk and thrive far better on it than on sour milk, buttermilk, or whey.

But not every dairy has a separator. There are still many dairies in the country where the milk is cooled in a picturesque springhouse just as it was during the last century. But dairies of this kind usually sell their milk for consumption in the natural state and not as cream, butter, or cheese.

Handling milk for family use. Modern improvements in the methods of handling milk for family

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On the great modern dairy farm of to-day the electrical milking machine is taking the place of hand labor

use in cities and villages have been little short of marvelous. To-day there are hundreds of dairy farms which ship milk to the big plants every evening. Many of them milk from seventy-five to one hundred cows each and some of the larger farms several hundred cows. On these large farms to-day the milking machine, a modern labor-saving device, is being introduced. This ingenious machine is operated by electricity and is a great boon to the farmer with a large herd in a region where farm laborers are scarce and wages high.

If one of these farms is close to a large city it will send its whole milk—that from which the cream has not been taken—to the city.

A model dairy farm. Not long ago the writer visited a large dairy farm near Chicago, and watched the handling of milk for the people who live in that city. Some of it goes to children who have never even seen a cow!

Everything connected with this farm was almost ideal. Its immense barns were as well ventilated and lighted as a modern school building. The cement floors of the stable could be flushed and washed clean with comparatively little labor. In winter a stream of cold, pure spring water flows through the long cement drinking and feeding troughs. There is hot water for washing purposes and the milkers are required to bathe frequently and to wash their hands and the udders of the cows

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Interior of an up-to-date stable on a great dairy farm. Fine ventilation, cement floors, and running water make this stable a model of cleanliness

before each milking. The milk house, which stands at some distance from the barn, is equipped with

heating and refrigerating devices so that the milk may be cooled quickly or heated to any required

Courtesy of Oak Glenn Farm

Holstein cows on a model dairy farm

degree. The bottling room also has live steam for the scalding of bottles and all vessels in which milk is placed. This model dairy is also fully equipped with milking machines which may be used whenever convenience requires.

Value of shady pastures. This farm abounds in grassy pastures threaded by a clear, cool stream with a rocky bed and banks overhung with trees. In the heat of summer the cows stand in this shaded stream, making a striking picture of contentment, while the rich grasses gathered from the pasture are being distilled into milk for the children of the city. The owner declares that this well-shaded stream is one of the farm's most valuable features; for quiet, comfort, and contentment on the part of the cows are necessary for the production of high-grade, perfectly wholesome milk.

Bottling the milk. Since this model dairy farm lies close to Chicago, the milk is sent to that city and marketed as whole milk. There, as near all

large cities, are large milk-bottling plants to which many farmers send their milk. The milk is carried in wagons or by motor to the railroad station, where it is put on special milk trains and hauled to the bottling works. Here it is strained, put through the clarifier, pasteurized, and then bottled. There are also large separators which take the cream from the milk. The cream is sold directly to customers, while the skim milk from the separators is either used in bakeries, sent back to the farms to be fed to the stock and poultry, or sold to the producers of milk-fed chickens.

Pasteurized milk or cream is that which has been

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A huge sterilizing machine in a milk-bottling plant. All bottles are sterilized by live steam before they are sent to the bottling room to be filled with milk

heated to a point just below boiling, at which all bacteria are killed. Immediately following this

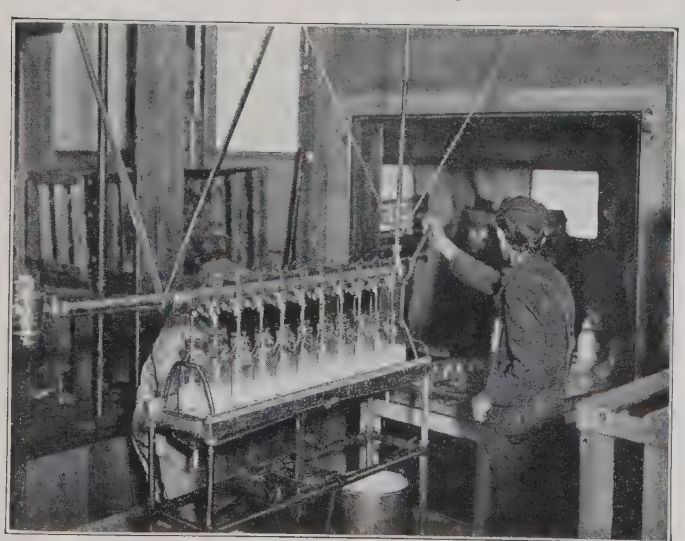
heating, the milk is cooled to 50° F., or possibly a little lower.

Testing milk. All milk must be tested before it is accepted in these bottling plants, for when it is sent to the city in bottles, to be delivered to the homes of consumers, the milk must have their guaranty of purity back of it. There are city, state, and federal milk inspectors who work in the different cities and whose business it is to see that no impure or unwholesome milk is sold. They must protect the people who purchase their milk and cream indirectly from the bottling plants or directly from the farmers.

Perhaps you would like to know just how a city using about 260,000 gallons of milk a day protects its citizens from impure milk. This city maintains special investigators whose business it is to "plate" samples of milk for bacteria. This means that, without notice, they take samples of milk being delivered in their city, carry them to their laboratory and there "culture" them, or give the bacteria a chance to develop. If harmful bacteria are found, the milk is rejected and immediate action taken to prevent further deliveries. The plant or farmer furnishing the milk is also subject to prosecution.

Work of the inspector. But the city inspection does not end here. Inspectors, whose duty it is to see that the farms themselves are kept in proper condition, are sent to the various dairy farms which furnish the milk for the city. They also inspect the bottling plants and the methods in use there. The cows furnishing the milk must be inspected at stated intervals by a registered veterinarian to see that they are in good health.

In one city which takes these precautions, there are about 3,200 wagons delivering milk from some



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After leaving the cooler the milk runs into a large tank from which it is automatically drawn into sterilized bottles

1,300 distributing stations. These stations are scattered broadcast throughout the whole city.

Precautions to protect the public. Now let us take a look into one of these great milk-bottling plants, which are located throughout the dairy district of our country and maintain many branches in near-by cities. Let us see how they protect the public and meet the requirements of city and state authorities.

These bottling plants buy milk only from the dairy farmers with whom they make contracts and who will live up to their regulations. They employ high-grade, practical dairymen to go from one contract

farm to another and offer suggestions calculated to encourage the production of more and better milk. The bottling companies also have expert veterinarians whose business it is to make frequent visits to the various dairy farms under their contract and see that the cows are in prime condition and receiving proper treatment.

The dairy experts divide their time equally between the plants and the farms. In the morning they are at the plants, sampling and testing the milk, as it is delivered, to make sure that it is up to the standard of quality and purity. In the afternoon they visit the various farms and seek to give the producer every possible assistance in his work.

A trip through a bottling plant. In the bottling plant visited the manner in which the milk was handled was especially interesting. When the farmers brought it in it was emptied into the receiving tank and weighed. The weight was credited to the farmer and the milk passed on to the clarifier, which removed any foreign matter that may have gotten into it. Then if the milk was found satisfactory, it was passed on to the cleaner. From this machine it went to the uniforming tank where all the milk was mixed together. Then it passed to the pre-heater. There, by the aid of hot water coils, the milk was raised to 90° F. Next it went to the pasteurizer where it was raised from 90° to 145°, when it was forwarded into what is called the compartment holder. This is to keep the heat at a uniform temperature until the milk is thoroughly sterilized, and then gradually cool it. From the compartment holder the milk was fed into the cooler where

it was reduced to about 45° F. Finally it was automatically put into sterilized bottles and sealed.

Brown Bros.

Sealing the bottled milk with caps. After it is cooled the milk will start on its journey to the city

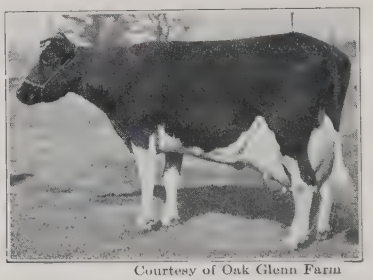
It was then cooled again and placed in refrigerator cars for shipment to the city.

When the milk reaches the city, the cars are distributed to the various branches about town where the delivery men assemble for their supplies. Within twenty-four hours after leaving the farm, milk is delivered to the consumer.

Certified milk. There is one grade of milk that sells for about twice as much as ordinary commercial milk. This product is known as certified milk.

Certified milk is produced on a farm approved by the milk commission of the medical society of the city in which it is to be distributed. It is put into special bottles and sealed with special caps, which are furnished to the farmer who has been given a permit to sell certified milk.

The certified milk permit is awarded a farmer only after a committee of the milk commission has visited and inspected his buildings, his cattle, his help, and his utensils. If the quality of the milk produced, the sanitation of the buildings, the methods used, and the health of the stock and employees are all satisfactory, the place is certified. The certified farm must be inspected at frequent intervals and the milk constantly tested. The bacteria test for cleanliness is generally required.



Courtesy of Oak Glenn Farm

A pure-bred Holstein cow

The care necessary to keep cows, premises, and employees in a condition satisfactory to the inspectors involves a large amount of work and heavy expense. As a result of the exacting care given to the production of certified milk, it does not have to be pasteurized.

Cows for milk and butter. The Holstein is the favorite cow of the farmer selling milk for use in the natural state, since cows of this breed usually give the largest quantity of milk. A good Holstein cow will give about 8,000 pounds of milk a year, or 28 quarts a day during the best milking season. But Holstein milk is likely to yield only about 3.5 per cent of butter fat, while 4.5 per cent is a fair percentage for Guernsey and Jersey milk.

Butter is the most important product obtained from milk. From 83 to 85 per cent of butter consists of butter fat, the remaining 17 to 15 per cent being moisture and salt, with a trace of proteins,

milk sugar, mineral substances, and sometimes coloring. Now let us see by what methods it is made.

Butter making, ancient and modern. The use of butter dates back thousands of years to the time of the ancient Jews. The old-fashioned way of making it was to allow the milk to stand until the cream which came to the top was properly ripened. Then it was skimmed and churned. But to-day that method is not generally used. Suppose we follow a load of milk that a dairy farmer brings to the creamery. First the milk is sampled and, if found below requirements, is rejected. If accepted it is poured into a large weighing tank and weighed. The farmer is given a duplicate of the weight slip and at the end of the month or perhaps the

Removing the butter from the huge churns Brown Bros.

fortnight a settlement will be made. Usually the price of milk is agreed upon for the whole month.

After this the milk is emptied from the weighing tank through a long pipe into a vat in the creamery.

Dutch girls at work in a Holland butter factory Brown Bros.

From this vat it is put through the separators and the cream taken off and run into a pasteurizing machine and then into another vat. The skim milk is run into large cans and delivered back to the farmer.

The cream is ripened in what is known as a starting tank, where hot water coils aid the process. In order to bring about the necessary fermentation, a "starter" of curdled milk is added. Butter coloring is also added and when the cream is properly ripened it is turned into huge churns and churned at a temperature of about 60° F.

The butter forms in little golden globules and the remaining liquid is called buttermilk. This is drawn

off and put into tanks or pails, and if the creamery is located in a town, there is usually a ready sale for the buttermilk as a summer beverage. The butter is then washed with clean water and salt worked into it. The salt acts both as a means of making it more palatable and as a preservative, keeping the butter fresh for a considerable length of time. Butter made in this way is known as creamery butter.

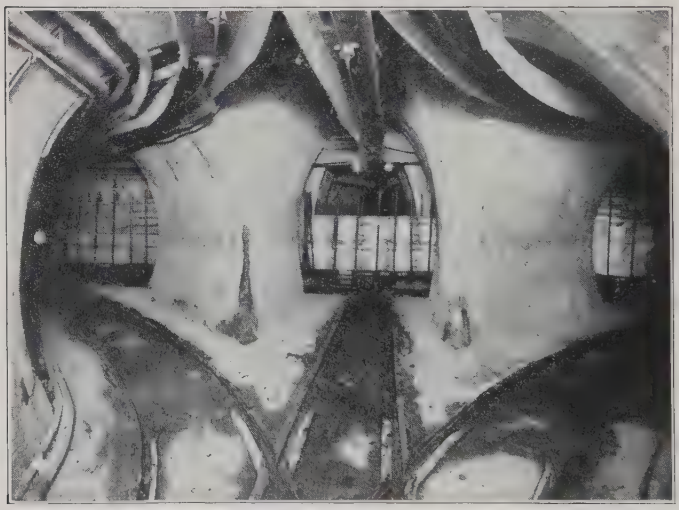
Packing butter for market. The butter is put into tubs or boxes in which it is to go to the retailer. If it is to be sold in pound packages it is put into a large box having slits in the sides. Through these slits are slipped wires which cut the butter

Brown Bros.

Storing butter that has been packed for market in a modern cold storage warehouse

into pound bricks. The butter is then wrapped in specially prepared paper and shipped to market.

The world's greatest butter makers. The United States makes about 650,000,000 pounds of creamery



Starting butter on its way to the consumer. A subway freight train is transferring it from a storage warehouse to a refrigerator car of an outgoing train

butter a year. Of dairy butter, which is made on the farm and usually sold in bulk, the United States produces about 995,000,000 pounds a year. In one year the United States exported more than 6,000,000 pounds of butter to other countries. The greatest butter-making countries in the world are the United States, Canada, Holland, Belgium, Denmark, and Germany. The United States rivals Denmark in the quality of its butter.

Renovated butter. Perhaps you have heard of "renovated butter" or "processed butter." This is made by working over low-grade or slightly spoiled butter.

The processed or renovated butter is made from "packing stock," which is old butter gathered from various sources. The "packing stock" is melted down and the oil drawn or ladled out, the salt and foreign matter settling to the bottom of the tanks. This leaves pure butter oil. This oil is then aërated and sweetened by having fresh air blown through it. After this process it is again placed in a churn and some good cream or whole milk added to give it the desired flavor. Salt is then worked in and the finished product put into packages.

The manufacture of renovated butter is controlled by the internal revenue department of the United States government. The factories producing this product are given license numbers which must appear on their packages, which are sold under a revenue stamp.

Chapter IX

CHEESE

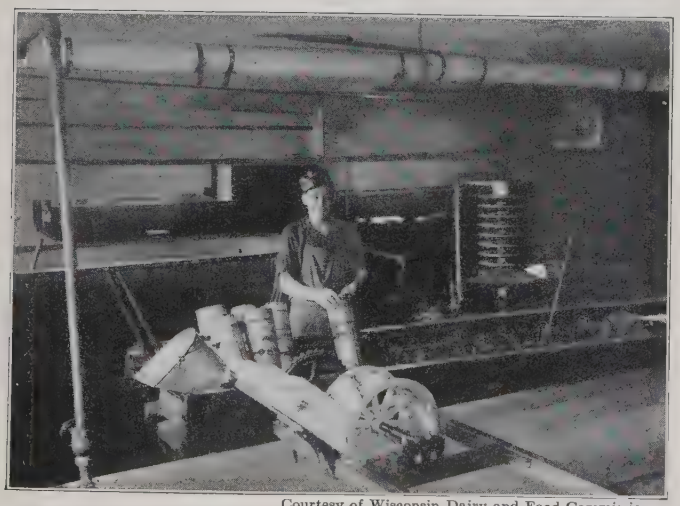
One of our oldest industries. Cheese making is one of the world's oldest industries, and cheese has been used as food from a very early date. It is frequently mentioned in the Old Testament. There is found Job's complaining inquiry: "Hast thou not poured me out as milk, and curdled me like cheese?" and David carried "ten cheeses unto the captain of their thousand."

Climate a factor in cheese making. Few manufactured foods are so dependent upon natural conditions—such as location, soil, water, and climate—as cheese, for cheese making is an agricultural as well as a manufacturing industry. This fact, together with its wonderful history, makes cheese one of the most fascinating subjects in the study of food geography.

But the two elements which have most to do with determining the qualities of cheese are locality and climate. A little later, when you read about the cheese makers of the Old World, you will learn why cheese making with them is not only a community craft but an inherited occupation. But now let us see how sensitive cheese is to the influences of climate.

The climate of one locality may differ only a little from that of another region near by, and yet that slight variation in temperature and rainfall—for these are the chief characteristics of climate—may be enough to fix borders within which a certain kind

of cheese can be made and beyond which it cannot be made with assured success. In cheese production climate draws geographical boundaries both narrow and exact. All cheese is made from milk, and nearly all domesticated animals which give milk in considerable quantities have a share in cheese



Courtesy of Wisconsin Dairy and Food Commission

In a Wisconsin cheese factory. Placing hoops, filled with curd, in the cheese press

production. Of these animals cows, goats, sheep, camels, and horses are the principal ones.

Because cheese is made from milk, good pasturage is necessary. This can be had only where there is an abundant rainfall, or where irrigation supplies the necessary moisture. Most of our domestic cheese is made in Wisconsin and New York. In those states all the cheese factories are in localities which during the cheese-making season—May to September, inclusive—have a mean temperature of about

65° F. Experiments conducted by the United States government have established the fact that nearly all these factories are in districts which have a growing season of about one hundred and fifty days.

Two great cheese-producing states. Since Wisconsin now produces more cheese than any other state, let us study the work of the cheese makers of that state and also the cheese they produce.

There are about 2,000,000 dairy cows in Wisconsin and more than 2,000 cheese factories. About one fourth of the factories are engaged in making "foreign style" cheese. In one year the great cheese-making district of southwestern Wisconsin produced about 30,000,000 pounds of "foreign style" cheese.

New York produces almost as much cheese as Wisconsin and both states make many kinds of "foreign style" cheeses. Brick and domestic Swiss cheese are the principal products of the Wisconsin cheese makers, while New York stands unrivaled in the quantity of high-grade Limburger produced.

Coming of the Swiss cheese makers. In his admirable work on the Wisconsin cheese industry Professor O. E. Baker, of the United States Department of Agriculture, says:

"The coming of the Swiss to southwestern Wisconsin commenced in 1845, when 140 immigrants arrived from Glarus, the Canton authorities having appropriated 1500 Gulden to send them over to relieve the labor surplus at home, caused by depressed financial conditions at that time. The immigrants settled in the northwestern portion of Green County, and named the town New Glarus in memory of their old home. This portion of Green

County is rough to rolling in topography, and although these early pioneers did not find anything

Courtesy of Wisconsin Dairy and Food Commission

Removing the cheese from the hoop after it has been pressed to the proper hardness

here to compare with their beloved Alps, they did find an abundance of hills, with cool springs and ever-flowing streams between, and a soil similar to that of their native land.

"Other Swiss followed in 1846 and 1847, among them also a few cheese makers, and although they were poor, they were industrious and frugal, and were soon able to purchase a cow. After a while they would buy another cow, and a few years later a third. Thus the industry grew slowly, under the domestic system of production, for about thirty years, keeping time to the tinkling of the cowbells, which every sentimental Swiss even to-day insists upon attaching to his favorite cow."

It was not until about 1870 that the supply of

cheese made by these thrifty Swiss folk exceeded the local demand. But before that time a little cheese had been sold to the German people of Milwaukee and Madison, who were already familiar with the excellent qualities of Swiss cheese, or "Schweitzerkäse," as they called it.

To-day Wisconsin is producing annually many million pounds of cheese which is being sent to all parts of our country. Yet there are Swiss families in the state still making cheese after the manner of their forefathers in the Old World. In fact, there is to-day one little cheese factory where three generations of the same family are working, side by side, producing cheese closely resembling that which their forbears made on the grassy slopes of the beautiful Alps.

From father to son. No one knows how long the people of Europe have been making cheese, for this food dates back beyond written history. It is not unlikely that cheese making began in an effort to utilize the surplus milk to insure a food supply in times of scarcity. Cheese making is an art that is handed down from generation to generation—and the knowledge of how to make the particular cheeses for which they are famous is perhaps the richest possession of the people in certain districts.

As soon as he is capable of learning anything, a boy in the cheese-making section of Switzerland is taught that he is to follow the trade of his father. Of course there may be exceptions to this rule, but in the cheese-making districts they are rare. The Swiss children raised in the cheese-making communities understand that they are to make the same kind of cheese as their fathers, mothers, grandparents,

and great grandparents made—and make it in the same place. The same thing is true of France and Norway. This is one of the best examples of inherited callings and of home craftsmanship, and vocational education at the hands of parents to be found anywhere in the world.

Courtesy of Wisconsin Dairy and Food Commission

Determining ripeness of the milk before adding the rennet

"Foreign style" and imported cheeses. In practically every important cheese-making district in the United States one will find little factories where experts from the Old World, either German, Swiss, French, Italian, Dutch, or Swedish, using the same care make a product much like that made by their forefathers.

However, we must not forget that certain European cheeses cannot be successfully imitated in this country and that the "foreign style" cheeses made here are not identical with those of the Old World upon which they are modeled. But each year the foreign style cheeses made by experts who have inherited the skill of European makers are becoming more popular. This is true even with consumers who are familiar with the imported article.

While our domestic, or American-made, cheese is both nourishing and "tasty," there are many Americans who are satisfied with nothing less than genuine imported cheeses. It is for these people that the European countries each year send many

thousand pounds of cheese across the sea. From Italy alone we receive a dozen different kinds.

Display of imported and domestic cheese carried by a great grocery house. It represents products from nine countries and thirteen states

England and France also contribute a large variety, as do Holland, Belgium, and Denmark.

The following descriptions cover the various cheeses carried by high-grade grocery stores and delicatessen shops in a large city. There are many more kinds of cheeses—one authority describes two hundred and forty-six different kinds—but these will be enough to enable you to learn what countries help supply the cheese for our tables.

Norwegian cheese. From the high mountain sides of Norway we receive gedost (goat's milk) cheese. This is a combination of certain grains, sweetening, and goat's milk curd. It has a sweetish taste, and is the color of maple sugar. From Norway we also get gammal ost (old cheese) which is

made of cow's milk and packed in straw until properly cured.

Edam cheese. Edam is the great cheese of the Netherlands. It comes in balls, almost as large as your head. It is often done up in tinfoil and is usually painted red with a vegetable coloring, and then coated with paraffin. Edam varies a great deal in quality because of the differing percentages of butter fat taken out of the milk before the cheese is made. When no butter fat has been removed from the milk, the cheese contains from 45 to 50 per cent of butter fat. Another grade of Edam cheese contains from 20 to 30 per cent, or even less, of butter fat.

Most of this cheese is made by the peasant women on the farms in the Netherlands and brought to market, where it is sold to the consumer as many farmers of this country sell eggs and butter.

Roquefort, Camembert, and Brie. The best-known French cheese is Roquefort, which comes from the town of Roquefort, perched high on a mountain in the Department of Aveyron. French historians tell us that, as far back as "Bible times," cheese was carried from Roquefort to the Mediterranean Sea. This was due to the fact that Roquefort is ideally located for the making of cheese. The peasant people used to carry cheese to the top of the mountain and hide it in the limestone caves, which were found to be especially fitted by nature for the storing of cheese. The cool temperature of the caves made them excellent storehouses.

Finally, a knowledge and appreciation of this famous cheese began to extend beyond the Roquefort district. Then men of keen business sense

started to buy and sell it to meet a growing demand. And that was the beginning of the famous Roquefort

Curing Roquefort cheese in a limestone cave

cheese industry. As the business grew the caves were enlarged. Now each cave cut out of the limestone has an air shaft coming out of the top of the mountain and is well lighted.

The chief occupation of the peasants around Roquefort is making cheese, which they bring to the caves to sell. Every family within miles of Roquefort brings cheese to the various caves. This cheese is made of sheep's milk. Great flocks of sheep, raised especially for their milk, graze on the mountain side about this quaint old town. So great is the demand for Roquefort cheese that there are more than 600,000 milch sheep on these hills and mountains.

The shepherds wear dark, gownlike coats which

reach almost to the ground and give them a most picturesque appearance. Most of the clothing of the shepherds and their families is made from wool taken from the backs of their own sheep and carded, spun, and woven in their little stone cottages. Besides the shepherd, each flock is also tended by two dogs. These dogs move the sheep about over the grazing grounds or "commons" with a quietness and care that astonish visitors. Usually the sheep are brought into the fold each night for milking and shelter. The southern slopes of the mountains and foothills, fresh and green in winter, become burned and browned in summer. Therefore winter grazing is on the southern slopes, while in summer the flocks feed from the northern exposures.

Among pastoral people in Europe there are none, perhaps, more interesting and picturesque than the shepherds of Roquefort. The habits and dress of

Receiving cheeses in the storage room of a limestone cave

these people have altered but little since the commercial world, centuries ago, first heard of Roquefort

cheese. Grandfather, father, and son are shepherds; grandmother, mother, and daughter are milkmaids —and all are cheese makers. In many instances, however, the shepherds milk their flocks.

Every morning the milk is skimmed, strained, and warmed almost to the boiling point. It is then put into pans and stirred with willow wythes. A little rennet is used to curdle the milk. After the curds have formed they are mixed with a specially prepared barley bread, which starts the green mold always to be seen in Roquefort cheese and helps to give it its distinctive flavor.

The cheese is allowed to remain in the press for several days and is then taken to the caves and sold. There it is cured with salt. Girls employed in the caves rub the outside of the cheese with salt until all the pores are closed. This forms the rind. The cheeses are cured in the caves for about four months, when they are shipped to nearly all parts of the world.

A fine sample of Roquefort cheese

One legend as to the origin of the Roquefort cheese tells us that one rainy day a shepherd sought shelter in one of the limestone caves near the present city of Roquefort and that, in hurrying away after his flock, he left his lunch of sheep's milk cheese and bread behind.

Some weeks later he was again driven to seek shelter in the cave and found his cheese thickly

molded. He tasted it and liked it so much that he formed the habit of leaving cheese in the cave

Turning the cheeses that are being cured in a storage cave

to mold. Later he gave some to the village curé, who was enthusiastic over its flavor and began experiments in producing a quantity of it for the other priests, who were finally responsible for making it a popular favorite.

While the peasant life about Roquefort has not changed in the least, the caves represent the most advanced and modern methods of handling cheese. They are electric lighted throughout and equipped with every mechanical convenience. Enormous motor trucks haul the cheese from the caves to the various shipping points. The whole industry is run on an efficient, business-like basis.

Camembert is another famous French cheese. It is made from cow's milk and is a soft, rich, creamy cheese hailing from Normandy. A small cheese, it is put up in round wooden boxes, making a package that weighs about ten ounces. Like Roquefort, it has a world-wide popularity. It was first made

The exporting and importing areas of dairy products, with chief lines of export

about 1790. Its flavor is as distinctive as it is pleasing, which makes it a favorite wherever rich table delicacies are in demand. This style of cheese is successfully made in the United States.

Imported Brie cheese, mention of which is made as early as 1407, comes largely from the region of Brie in the district of the Marne in France. This cheese is made from cow's milk in the homes of the farmers and is put up in the shape of a pie. It is usually cured in cool basements. The packer and shipper of this cheese sends his wagon around to the homes of the makers, picks up the cheeses, and brings them to a central place where they are cured and packed. In taste Brie cheese is quite similar to Camembert —which is paying it a high compliment. A good many imported Brie cheeses come from Fontainebleau, a place intimately connected with the life of Napoleon.

Italian cheeses. Perhaps the most familiar Italian cheese is the Parmesan, which is used mostly by chefs for flavoring spaghetti, macaroni, and other dishes. It is thus used because it is so hard that it can be grated and produce an even mixture, and also because it has strength enough to give the required flavor. Parmesan cheese is made from skimmed cow's milk and, under proper conditions, may be kept for several years.

Gorgonzola is the aristocrat of Italian cheeses. It is very widely used and is somewhat similar to Roquefort, but not so expensive. Like Roquefort it is made of sheep's milk, but is milder in flavor. Gorgonzola is put up in twenty-pound baskets, one cheese to a basket. The outside of this cheese is covered with a preparation made chiefly from

gypsum and tallow. This coating makes it possible to keep the cheese for a year or more. Much of this cheese comes from the province of Lombardy.

Genuine Swiss cheeses. Most of us are familiar with the rich, delicate flavor of Swiss cheese. There are a good many kinds of "Swiss style" cheeses made in America. While this cheese is rich and of pleasant

In a corner of a cheese refrigerator in an American wholesale grocery. Cheese packed and cared for in this way remains fresh for a long time

flavor, it lacks a certain quality, not easily described, although detected at once by the sensitive taste of the cheese lover. It is the product of an inherited art, together with climatic conditions which do not exist in this country. It is also possible to tell by sight the difference between the genuine imported Swiss and the "Swiss style" American-made cheese. The real Alpine article has very large "eyes" and is fine in texture.

The Swiss cheese known as Emmenthaler is made of cow's milk, and is put up in wheels of about two hundred pounds each. Its manufacture is said to require more labor than that of any other cheese. This is because it must be washed and rubbed with salt each alternate day for the first week or so and then a little less frequently until it is fully cured.

You will surely wish to know the history of Emmenthaler cheese, which dates back many centuries. Long ago the thal or valley of the Emme in the Alps became a great cheese center; hence the name Emmenthaler. Ever since the conquests of Caesar, and probably before, the peasants of Switzerland have pastured their cows on the grassy slopes of the Alps.

Emmenthaler cheese is made in small, immaculately clean factories, or cheese dairies, scattered throughout the numerous valleys which lie between the beautiful foothills and mountains of Switzerland. A factory is usually run by one family. This family may consist of a mother and father, some children, and perhaps the grandparents, all engaged in making cheese. Often a family factory will include only a man and his wife. There is a basement cheese depot in the city of Bern where, for fifteen generations, members of one family have cured and handled Emmenthaler cheese.

Emmenthaler like Brie cheese is cured in basements or cool cellars. It is repeatedly treated with the amount of moisture and salt necessary to give it the desired flavor. This treatment consists of first washing the cheese with pure, cool water which bubbles from a mountain spring, and then rubbing the "loaf" or "wheel" with salt. The salt soon

dissolves and great beads of water are left standing all over the loaves. For this reason it is often called

Courtesy of R. A. White

A Swiss herd of cows and goats on the way to fresh pasture

"weeping Emmenthaler." The salt strikes into the cheese, giving it a peculiar flavor. The frequency with which this process is repeated largely determines the quality of the cheese.

The average Alpine factory will make 200 to 400 pounds of cheese a day. Occasionally one of the co-operative factories will make four loaves, or 800 pounds, a day—two loaves from the morning's and two from the evening's milk.

As a rule the family which does the cheese making has no part in producing the milk. Experts at their trade, these cheese makers are paid for their labor by those who own and tend the herds. The cheese factories are neighborhood affairs and nearly all of them are co-operative, the profits or losses from the

enterprise being shared by those farmers who send milk to it. Usually the cans of milk are hauled to the creamery in small, two-wheeled carts drawn by dogs. When the grade is steep or the pulling hard the peasant often takes hold of an extra strap or rope and gives the dog team a little friendly help.

The Alpine pastures are indescribably rich and green, and are given a watchful care seldom bestowed upon meadows in America. They are much more like velvety lawns than pastures. In the lower districts about 80 per cent of the Swiss cheese is made where the cattle remain the year round. The cows are not allowed their freedom in a fenced pasture as in this country, but are staked out. No cow is moved on to a fresh grazing spot until she has made a clean job of cropping the grass within the circle of her tether. This practice prevents the trampling and wasting of grass that is not eaten.

The problem of plowing fields and doing other heavy farm work is often solved by the thrifty Swiss in a way almost unknown in this country. The milch cows are yoked and worked as we work oxen in America. But great care and judgment are required in order that this work shall not check or injure the cows' yield of milk. So the careful Swiss farmer, instead of working one pair of cows all day, uses three or four pairs in the course of a day's plowing and drives them so slowly that they chew their cuds contentedly while pulling the plow.

But not all Swiss cheese is made under the co-operative plan. There is another kind of cheese making that is as picturesque as the scenes among which it is practiced. It might be called "following the snow line."

Before Switzerland became a republic, certain lords and nobles received grants of lands or "alps."

Courtesy of R. A. White

Haying time on an Alpine farm. Thrifty Swiss farmers use the milch cows for farm work

These alps were leased and released to one generation after another of the same peasant families. The word "alp" means not only a very high mountain but also a high mountain pasture and this is the meaning of the term when used in connection with the leased rights of pasturage.

As soon as the snow begins to melt in the spring, the Swiss peasant having a pasture right of this kind starts with his herd and a portable cheese-making outfit on a slow ascent of the slope. Of course the snow begins melting from the lower edge of the great drift. Then only a few hours after the sun has banished it from a stretch of mountain side a green carpet of grass appears.

The herdsmen who "follow the snow line" and graze their cows on these lofty Alpine pastures are usually their own cheese makers. They remain on the high slopes making cheeses until forced down by the coming of cold weather. Sometimes they and their cheese-making outfits are sheltered in rude stone huts, but very often in tents. When eating a piece of genuine imported Swiss cheese you may well say to yourself: "Quite possibly this was made by a wandering herdsman high up in the great Alps and cured in a rough hut or in a grotto built over a moun-

Courtesy of R. A. White

All summer the Swiss cheese maker stays on the high mountain pasture, herding his cows and making cheese until winter sends him back to the valleys

tain spring. Probably he took his older boys and girls with him to watch the cows and 'keep house'

while he made the cheese and washed and rubbed it until it was cured."

The prospect of a summer vacation of this kind would make many an American boy or girl almost wild with delight.

English cheeses. From England we receive Stilton cheese, which is made in Leicestershire. It is made from the whole milk of cows, to which cream has been added, and is put up in twelve-pound cases of cheddar shape. Some Stilton cheese is cured by putting it in a bladder and smothering it in Burgundy wine. Although this is often done, it is by no means the usual method of curing.

Stilton is a very rich cheese and has a sharp tang which suggests a family resemblance to Roquefort and Gorgonzola. It is said to have been made, for the first time, about the middle of the eighteenth century.

Although few Cheshire cheeses find their way to America this cheese is probably the favorite with the English public. It might be called the mother of all English cheese from the fact that it is the oldest type made in the United Kingdom. It is made from cow's milk, unskimmed, and has a rich color and taste. A peculiarity of Cheshire cheese making is the use of a heated wooden box called an "oven." There is a cheese called the Cheshire-Stilton which combines the main characteristics of these two famous English cheeses.

Another celebrated English cheese is the Cheddar. It takes its name from the quaint little hamlet of Cheddar in Somersetshire. Although this is considered a good cheese it is especially important from the fact that it has given its name not only

to a style of cheese but also to a shape, which suggests a tall, round bandbox. This form has become the standard in America for the regular domestic "cream cheese" of commerce. The peculiarity of the English Cheddar in point of quality is its decided acidity. It is made from the sweet milk of cows.

Canada makes large quantities of Cheddar cheese, but of a type more closely resembling the Cheddars of the United States than those of England. This is virtually the only kind of cheese made in Canada, which in a normal year produces about 200,000,000 pounds, of which it exports 180,000,000 pounds.

Other foreign cheeses. Germany is famed for its brick cheese, as well as for its Limburger. Limburger cheese, however, originated in Limbourg, Belgium, and not in Germany.

Caerphilly is a hard Welsh cheese made from cow's milk; it is put up in eight-pound packages. Bohemia sends us Liptau cheese, which is made from goat's milk and is usually seasoned with red pepper and spices. It is packed in tinfoil.

Odd types of cheese. There are many curious developments in cheese making — or at least they so appear to the boy or girl of the United States — caused by the kind of material available for curd. These oddities teach us that man is determined to have cheese and that he will make it of whatever kind of milk is most convenient for him to use. For example, in Lapland the most common cheese is made from the milk of reindeer. In certain parts of Italy, where the tame buffalo is much used as a work animal, a cheese called Latticini is made from buffalo's milk.

Several kinds of cheese are made by mixing the milk of different kinds of animals. The Montasio cheese of Carinthia, in Austria, is a blend of milk from cows and goats. In curing it is rubbed with olive oil. There are several styles of cheese made by mixing the milk of goats and sheep.

One of the most remarkable of what might be called cheese confections is the "flower" cheese of England — a delicious soft cheese in which are imprisoned the petals of roses or marigolds, or other fragrant blooms which give their bouquet to the cheese. Venezuela has a curious cheese called Queso de Cincho made in the form of balls pressed in palm leaves. The queer Gouda cheese of Holland — packed in bladders — occasionally reaches the American market.

Sources of our cheese supply. In a normal year we import about 50,000,000 pounds, or about $10,000,000 worth, of cheese. Of this Italy furnishes over 40 per cent, Switzerland 35 per cent, France about 9 per cent, the Netherlands 7 per cent, and Greece contributes about 5 per cent.

In one year we imported more than $11,000,000 worth of cheese. Of this we bought $5,024,270 worth from Italy, $3,617,651 worth from Switzerland, $1,032,817 worth from France, $455,159 worth from the Netherlands, and $447,124 worth from Greece. We also bought cheese from several other countries of Europe, Asia, Oceania, and South America and from Canada.

It is well to remember, however, that about 95 per cent of the cheese eaten in the United States is made in this country.

Chapter X

HONEY

The story of honey, one of our most popular sweets, is older than the Bible, older even than history. It was a favorite food of the ancients to whom sugar was unknown.

What is honey? Honey is the nectar secreted by the glands of flowers and gathered by bees for their winter use. Of all the sweets that come to our tables, honey is undoubtedly the most delicate and fragrant. It might almost be called the perfume of foods, for honey is the very essence of the flowers, sometimes retaining their distinctive aroma. Naturally the flowers of heavy perfume, growing in southern climates, secrete honey of much stronger flavor than those of a milder odor, common to more northerly climates. The warmer or temperate lands produce more honey because they have a greater abundance of flowers. Nevertheless, honey is gathered as far north as Finland and Quebec during the summer months.

How honey is stored. Housed in hives, the bees build combs made of layers of pure wax and divided into thousands of tiny cells in which the honey is stored. As it takes the bees about half their time to build the combs, the modern bee farmer makes the comb bases for them of beeswax. The bees accept these gifts and begin their work of gathering honey with little loss of time.

Bees as consumers of honey. The honey which the little workers store in the combs is used to feed

their young and to provision the entire swarm through the unproductive months when there are no

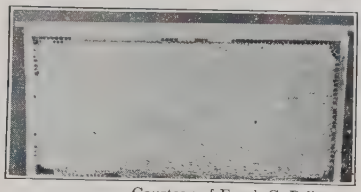
One of the large bee ranches in California. The vast orchards and vineyards of this state afford ideal conditions for the apiarist

flowers from which to gather sweets. So the bee farmer must not take all the honey gathered by the bees; he must see that they have their share. For this purpose, the hive is divided into two parts, the lower, or "brood," section being for the honey used as bee food, and the upper part being for the honey which goes to the bee farmer, after the brood combs are filled.

The frames, with their wax sheets of comb foundation, are called sections, each of which is intended to hold a pound of honey. Large frames are used when the beekeeper intends to extract the honey before marketing it.

Quality, color, and flavor of honey. Most flowers secrete nectar, though by no means in uniform quantity or flavor. To this fact are due the differences in quality, color, and flavor found among the

brands of honey from different parts of the world. The honey produced from orange blossoms, for instance, is of light color and mild flavor, while that produced from buckwheat is noted for its dark color and its very pronounced flavor. The quality of honey is also affected by the soil from which the flowers draw the material for making their nectar.



Courtesy of Frank C. Pellett, Atlantic, Iowa

A frame of honey to be extracted

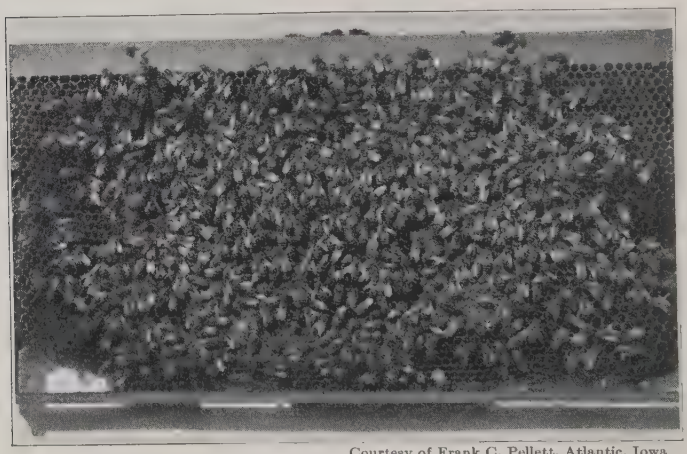
Honey-yielding plants. In the United States, the greater part of the honey produced is alfalfa honey from the Western States, where several million dollars' worth is sold every year. Sweet clover, white sage, and other mountain flowers also contribute to the western supply. In the Central States, white clover, sweet clover, Spanish needle, and heartsease furnish much of the supply. In the Southern States, cotton, mesquite, horsemint, and sweet clover, and in the East, North, and Canada, buckwheat and white clover are the leading honey flowers. Orange blossoms, cleome, aster, and basswood complete the list of the principal honey-yielding plants of North America.

Courtesy of Frank C. Pellett, Atlantic, Iowa

A busy day at the hive

The bees of Scotland gather their honey from the

heather. The honey of England and Northern France is much like that of Scotland. In Mexico, the bees



Courtesy of Frank C. Pellett, Atlantic, Iowa

A frame of brood and bees

secure it from the mesquite, the guajilla, the catclaw, and the horsemint. In the vicinity of Narbonne, France, the bees make Narbonne honey, which is like our white clover honey. The bees of Greece still draw their nectar from the wild thyme, as they have done from earliest ages when Mount Hymettus, near Athens, was celebrated, in many a classic masterpiece of prose and verse, for the quality of its honey.

Poisonous honey. Can you find Trebizond on your map? It is a town on the Black Sea in Asiatic Turkey. The bees in the country around Trebizond collect honey from poisonous flowers, and as a result the honey found there is poisonous. Great care is used to warn strangers against its use. Honey experts the world over know about the injurious qualities of Trebizond honey.

New and old ways of handling honey. You may have heard about "bee trees" and the ancient method of gathering honey from hollow logs or stationary boxes covered with boards. The old-fashioned bee farmer did not know how to gather his honey without making a dense cloud of smoke to drive out the bees, or killing the whole swarm with sulphur fumes. The combs, which had to be cut from the box, could not possibly be removed without injuring the swarm. The honey obtained by this

Courtesy of "American Bee Journal"

Bee farmers of an up-to-date apiary taking the frames of honey from the hives

method was usually of poor quality, containing bits of wood, bee glue, bee bread or pollen, and dead bees

So when it was pressed out of the combs, it had to be strained, thereby gaining the name of "strained" honey.

The up-to-date bee farmer, however, uses movable frame hives and honey sections, in which each comb is hung separately in a frame. With the aid of a little smoke to keep the bees quiet, he can remove the honey with small waste of time and without killing a single bee or so much as getting his hands sticky from honey. This method enables him to keep the honey pure and sanitary and free from contact with any touch save that of the bees.

Kinds of honey. When we go into a store to buy honey, we find that there are usually three kinds from which to choose. Comb honey is the product in the comb, just as it comes from the hive. Strained honey, now generally known as extracted honey, is that which has been extracted from the combs, strained, and put up in bottles or cans. It forms about nine tenths of all the honey sold. Candied or granulated honey is honey that has been allowed to crystallize into a kind of sugar.

Blending honey. Because of the great variety of honey flavors, it is customary to blend the product, much as coffees and teas are blended. For instance, the flavor of the honey made from mountain sage is very mild, while that made from buckwheat is decidedly strong. But a blend of these two makes a very delicious honey.

Wide use of honey. Honey is one of the most widely used of all foods. We are told by an explorer that when traveling through a river basin in the wildest and most unfrequented part of Burma and Tibet, his party was able to secure from the Lissu

natives besides a few pounds of rice and maize two bamboo tubes full of honey.

In one year, the United States imported from other countries more than 115,000 gallons of honey. About half of this came from Cuba, and perhaps a third from Mexico. Among many other countries from which we receive honey are Greece, New Zealand, Tasmania, China, Japan, Portugal, Switzerland, Jamaica, England, Russia, and Turkey.

Chapter XI

POULTRY

Poultry and the meat supply. The importance of poultry as a part of our national meat supply is appreciated by very few of us. Outside of the poultry trade there is probably not one person in ten thousand who has a true idea of the immense volume of this kind of meat produced and consumed in our country every year. The people of the United States eat annually more than 250,000,000 domestic fowls, such as chickens, turkeys, ducks, geese, pigeons, and guinea fowls.

Probably the reason why the importance of poultry is so little appreciated is that the production is to so great an extent incidental. Almost every farmer in America has a flock of chickens which have the run of the farm and to which little attention is paid because they pick up the most of their living. Then, too, it is the common practice for the family in the village or country town to keep a few chickens, not as a money-making enterprise, but because the flock consumes the table waste and in return furnishes fresh eggs.

Raising poultry. To a large extent poultry is a by-product of the farm and the village home, and is not produced like beef, pork, and mutton as a means of livelihood, or as a business enterprise. Therefore the magnitude of this food resource escapes the serious consideration of almost everybody.

The very fact that a small flock of chickens can be kept by the village family having only a tiny

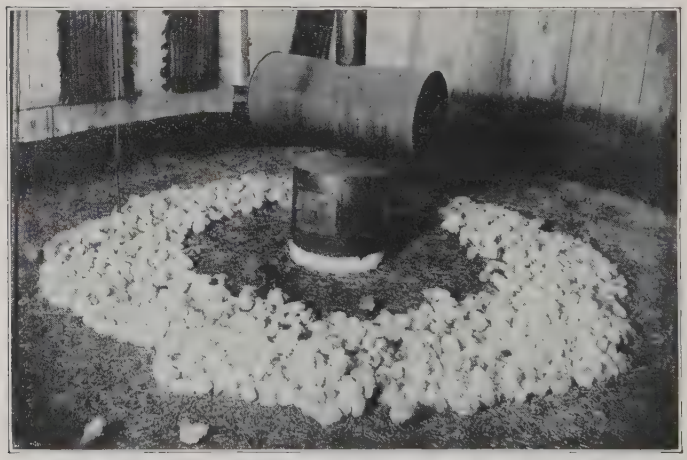
patch of ground—perhaps just enough for a small henhouse and a little yard—suggests the secret of the enormous total of poultry production. In other words, the army of poultry raisers vastly outnumbers those engaged in raising cattle, hogs, or sheep.

Because the great volume of poultry raising is done in an incidental way, it must not be understood that it is never conducted as an industry in itself. There are thousands of poultry ranches in this country devoted to the exclusive production of table fowls and eggs. Then, too, it must be remembered that millions of city dwellers, especially those living in flats and apartments, are denied the privilege of keeping even a small flock of hens. This public, which is extremely large, must depend upon the

Raising poultry as a business enterprise. There are twenty-five hundred hens kept on this successful poultry ranch

feathered flocks of the farm, the village, and the "chicken ranch" for their eggs and poultry.

But the man who raises the poultry does not usually sell his product direct to the consumer, any



Newly hatched chicks in the brooder house of a great poultry plant

more than does the man who raises the beef we eat. There are middlemen who look after all the work connected with preparing and marketing these fowls.

Feeding stations. The service of the middleman is sometimes far more interesting than you would suspect. As an instance, take the "feeding station" or "poultry-fleshing factory," as one of the United States government experts calls it:

"The manufacture of chicken flesh is being put on a factory basis and made into a factory proposition, improving the quality and increasing the quantity. In other words, we are learning how to do things.

"The farmer feeds his birds on corn, if he feeds them at all. Generally, however, they must forage

for a living. These birds when sent to the poultry packer are far from fat. It does not pay to ship other than plump birds to the market—hence the poultry dresser has installed what he terms 'feeding stations,' but which are, in reality, chicken-fleshing factories.

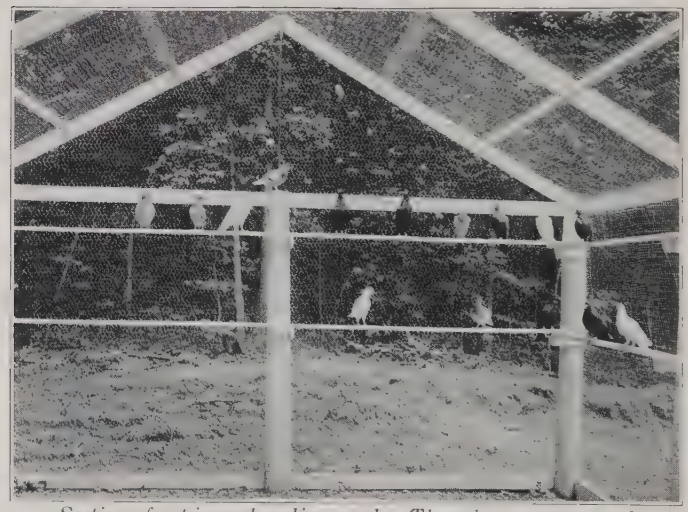
"These are light, airy sheds, or rooms, holding anywhere from 10,000 to 50,000 chickens, or other fowls, at a time. They are kept in what are termed 'poultry feeding batteries,' which are mammoth bird cages constructed either of wire or of wire and wood. The birds eat out of feeding coops, which are kept scrupulously clean.

"Only a few birds are put into each cage, that all may have plenty of air and each may get his full

A turkey drive. The advance guard of fifteen hundred young turkeys and their mothers on their way to market in an approaching holiday season

share of feed at the feeding time, which is, ordinarily, twice a day. After being in these cages for

fourteen days the birds are killed and dressed. During that time they are expected to gain at least



Section of a pigeon-breeding yard. There is a constant and increasing demand for squabs or young pigeons

20 per cent of their original weight. Frequently they gain more. The flesh which is produced under these circumstances is very tender and better flavored than that of the chickens that are allowed to run loose and pick up what feed they can find.

"The feed used in these fleshing factories is a mixture of corn, wheat, oats, and buttermilk, and in some cases meat scrap or alfalfa is added. The buttermilk is by far the most important part of the ration and is responsible for such birds having the market designation 'milk fed.'

"After the poultry is killed, unless consumed locally it is shipped to city markets or cold storage plants. In cold storage it can be kept in perfect

condition for several months, and marketed when fresh poultry is scarce. Into these cold storage plants go millions of dollars' worth of poultry every year, and there it is held until the fresh stock is exhausted and the markets call for the reserve birds."

Cold storage poultry. Concerning the ability of American cold storage plants to furnish poultry in season, the same government expert says:

"The poultry which is coming to market in such enormous quantities is going to the storage warehouses very largely, and we have no public reports of the holdings of poultry in warehouses, either public or private, in this country. But we know this: that all broilers (young chickens) for the entire year's supply are produced from July to October. All soft-meated roasters (chickens about six months old) are produced from September to December. There is never a time on any market when one cannot obtain these strictly seasonal types of chickens provided one is willing to pay for them. Therefore, it may be assumed that a sufficient number of broilers and roasters go into the warehouses to supply the demand throughout the nine months during which each variety is not produced."

Wild fowl. While the people of this country each year kill and eat hundreds of thousands of wild fowl of various kinds, mainly ducks, geese, quail, prairie chicken, partridges, pheasants, and turkeys, the volume of our wild game food with each year is fast becoming smaller and smaller. Every state in the Union, as well as the national government, has strict laws intended to keep the killing of game birds within reasonable limits. But in spite of these wise

statutes, this branch of our food resources, which might well be called the poultry of the woods, has been steadily shrinking until it is now only a mere fraction of its former volume.

For this reason many states are wisely liberating large numbers of English pheasants, quail, and other game birds that can be successfully hatched and reared in captivity. Where this has been done in a systematic and intelligent way, the woods and prairies have been restocked with game birds as fine and as valuable for food as those upon which the pioneers of our country depended for their "feathered meat." It is well to remember that the early settlers of our country depended upon wild game for meat

Courtesy of Wallace Evans

A flock of English pheasants. To-day large numbers of pheasants are being reared to replace the game birds of our country

to almost as great an extent as we do to-day upon the "poultry-fleshing stations" and chicken ranches.

Chapter XII

MEATS

The live-stock industry. The world's meat industry is so immense that one needs a keen imagination indeed in order to grasp its size and importance. It contributes to the tables of every civilized people

Courtesy of N. Dak. Dept. Agr. and Labor

A herd of cattle on a ranch in the Northwest, one of the important meat-producing sections of the United States

and to the feasts of many savage tribes, and it draws upon the resources of almost every country. The ranges and pastures of the United States, the plains of Hungary, the steppes of Russia, the pampas of South America, and the wild reaches of the Australian "salt bush" all help in the giant task of producing the world's meat.

No country is so densely populated and none so sparsely settled that it is not called upon to share in the interesting labor of raising live stock to feed the human race. Each country naturally selects that part of the work for which it is best adapted.

England the nursery of the meat industry. It might be thought, for example, that England, with its 51,000 square miles of land and its 34,000,000 population, would leave the raising of animals to countries with much more room for the four-footed creatures. But the "tight little isle" may fairly be called the nursery of the live-stock industry, for it raises the breeding material for the finest flocks and herds of the great meat-producing countries of the world. In other words, the beautiful country estates of England do for the live-stock industry of the United States, Canada, South America, Australia, and South Africa what the research laboratory does for the great manufacturing industry that it is intended to serve—they develop with the greatest degree of certainty and at the smallest expense the types of live stock best calculated to meet special public demands.

For instance, in the early stages of the cattle industry in America the Texas longhorn, a wild, gaunt creature, was the most common type. While it was adapted to range over wide reaches of country and could exist on plains that would look like deserts to the boy or girl of our settled farming country, it was not easy to fatten. Cattle of this kind have been almost wholly supplanted by the Hereford, the Shorthorn, and the Angus breeds developed on English meadows. There, by patient selection, has been bred a type of animal which, on the smallest amount of feed, takes on the greatest amount of flesh in the shortest period of time.

In sheep, Shropshires, Hampshires, and Oxfords are equally celebrated types of mutton sheep which have been perfected in England and distributed to

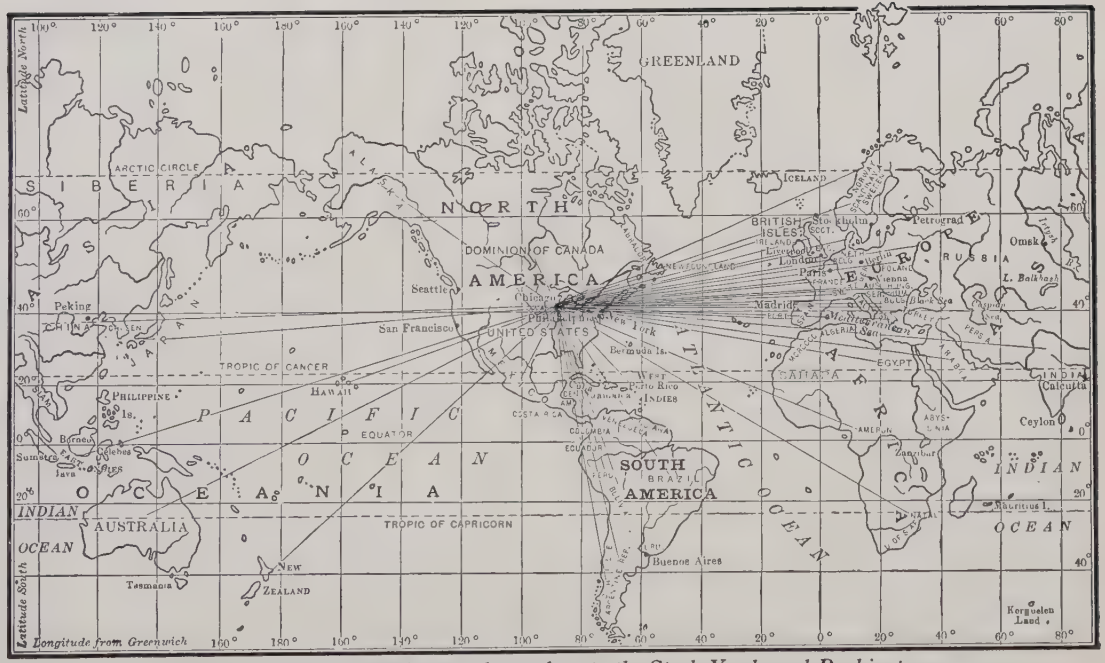
distant parts of the world. They have become the ancestors of the great flocks that graze on the western

Descendants of a famous English breed of Sheep. A flock of celebrated Hampshire Downs in the "Blue Grass Country" of Kentucky

ranges of the United States, the plains of Australia, the pampas of South America, and the veldts of South Africa.

As a nursery for the types of swine which are in greatest demand where the biggest part of the world's pork is produced, England again heads the list, with the Berkshires, the Yorkshires, the Hampshires, and the Tamworths.

In cattle, sheep, and swine, England has perfected many other breeds quite as famous as those mentioned. Many other small and densely populated countries have helped to build up the live-stock industry in much this same way, although to a less extent than England.



The countries from which come the workers to the Stock Yards and Packingtown

Home of pedigreed stock. It is interesting to know that the ancestors of most of the meat animals of the great live-stock-producing countries of the world, like the ancestors of most of the people of the United States, have come from the small and highly developed countries of Europe. In thousands of instances the pedigree of these animals may be traced with quite as much exactness as the family trees of the widely scattered descendants of peoples in continental Europe and the British Isles.

World-wide distribution of meat. Another interesting phase of the live-stock industry is its tendency to scatter out over the world and then return to the place of its origin. Year after year, England is sending to Australia, New Zealand, South America, South Africa, the United States, and Canada "foundation stock" for flocks of sheep of the best mutton types, and the descendants of these sheep are sent back to England in the shape of frozen mutton.

In the same way the cut of beef served in an English chop-house may easily have come from a Hereford steer born and pastured in Texas, and stall-fed in Illinois, whose grandsire was raised in Herefordshire, England.

The remarkable range of distribution in canned and dried meats is suggested by the fact that various parts of a single beef animal, for example, may be eaten in a dozen different countries scattered widely over the surface of the earth. There is no spot on the globe reached by traffic where meats in these forms have not found their way.

Meat-producing countries. Although about half the inhabitants of the earth eat but little meat, there are few people who do not eat at least some

every year. The burden of the immense work of meat production falls chiefly upon nine countries, and of these only the Argentine, Australia, the United States, Canada, Uruguay, and New Zealand have enough range and pasturage to be able to export any considerable amount of meat. But Denmark, although a small country, sends large amounts of its famous bacon to all parts of the world. In normal times, Mexico and Russia also export a certain amount of meat. Brazil is rapidly developing as an exporter of meats.

The world's surplus of mutton is raised mostly in Australia, New Zealand, and the Argentine, and the excess beef in South America, Australia, and North America. Three fourths of the world's pork exports are from the United States. Practically all the beef eaten in countries where it is not extensively raised is grown on the American continents.

The meat-exporting countries in one year sent almost 4,000,000,000 pounds of meat to the importing countries, most of it being "jerked" (dried) and frozen. America, however, exported some fresh meat, which was carried to European ports in fast refrigerated steamships.

Stock raising in South Africa. There is constant pressure to extend the area of meat production. In far-off Africa much attention is being given to the raising of animals for meat. But in British South Africa adverse conditions exist and it is only by the greatest effort that the stock raisers there have been able to increase the production of meat animals. In some parts of that country, because of irregular and insufficient rainfall, it is necessary for every stock raiser to have both highland and lowland

ranges. The uplands are used in summer for range and the lowlands in winter. In the drier parts of South Africa it sometimes requires from ten to twelve acres of land to support one sheep, and at least five times as many acres are needed for each head of cattle.

Suppose this condition existed in England or in Germany! The result would be an international calamity. In the thickly populated countries of Europe live stock must be raised on a minimum amount of land, and in Japan, where population is dense and tillable land scarce, the people practice intensive agriculture largely to the exclusion of the raising of live stock. To a great extent they substitute fish from the sea for the meats we enjoy.

American packing industry. In the great cattle-raising countries of South America and Australia are maintained enormous packing plants and cold storage warehouses, where thousands of cattle and sheep are prepared for export. But in studying the processes of preparing meat for the table, we cannot do better than consider the American packing industry, the greatest in the world—an industry whose products for a single year were valued at more than $1,500,000,000.

The principal domestic animals raised in this country for food are cattle, sheep, swine, and some goats. Since beef is the most important of our meat products, let us study that first.

The story of beef. Let us imagine that we are following a steer from his home pasture to the table at which he is to be eaten. In Colorado there is a certain ranch where the finest steers are raised. Surely there could be no better place to look for our

animal than on the rich, alfalfa-covered hillsides of this ranch. So let us assume that we are there and that we have selected a sleek "white face," which is being driven into the loading corral. He is four years old, weighs about eighteen hundred pounds, and has a distinctive mark which makes it easy to identify him. On his flank is the scar of the branding iron. The brand, let us assume, is a circle between two short lines, which means that the name of the ranch on which he was raised is the "Bar Circle Bar."

The loading corral into which our "white face" has been driven is on a spur of a railroad, a thousand miles or more from Packingtown. In the same corral are almost two thousand other steers, which within a week will all have gone through the stockyards at Chicago.

Usually ranchers sell their two- and three-year-olds to "feeders," who put them on rich pasturage and feed them corn and other fattening rations, until each steer has taken on several hundred additional pounds of flesh. There are "feeders" in the corn belt states who do nothing but buy undeveloped cattle from ranches, fatten them, and sell them for high-grade beef. There are also thousands of farmers scattered throughout the Middle West of the United States who take a few steers each fall, when range cattle come to the market in great numbers, owing to the ending of the pasture season, to "finish," or stall feed. "Native steers" are those finished on the farms where they are born. They are usually choice animals.

The Bar Circle Bar ranch maintains its own rich alfalfa pastures and large sheds for winter feeding. It is one of the last of the very big ranches and has

many miles of range. In pioneer days, our western ranches had almost unlimited ranges, the ranchers

Brown Bros.

Rounding up the cattle on a great ranch in the Southwest

being allowed to graze their cattle and sheep at will over the virgin prairies. But with the march of civilization and the enforcement of fencing laws, the great free ranges have disappeared, the big ranches have been cut up into smaller ones, and the plow has turned the range into farms.

From the loading corral our "white face" is put into a cattle car, together with a number of his brothers, and shipped to Chicago. Here the car is switched onto the railroad tracks which enter the stockyards and he is unloaded into one of the many thousand pens there.

The Chicago Union Stockyards, although standing alongside the great packing plants, is simply a hotel for live stock, in which as many as half a million animals in a single day may be received and cared for as

Unloading at the stockyards. When the cattle, sheep, and swine reach the stockyards they are driven from the cars into sanitary pens which are constantly under government inspection

"guests," although not more than about a third that number have ever been "entertained" at one time. Here the stock is received by a commission man designated by the shipper, whose business it is to sell them to the highest bidder, whether he be a local packer, a buyer from the eastern cities, or a "feeder." For its service the stockyards company receives a certain sum for each animal handled, and the commission man gets a fee for his work.

Our big steer is bought for one of the packing houses by a busy man in a raincoat, who clatters along the stone-paved streets of the stockyards on horseback. One of the many buyers in the stockyards, he is an expert on cattle values. He can tell at a glance the quality of a steer, how much marketable beef the animal will "dress," and what percentage of that will go into fine cuts. If he sees an especially fine grain-fed steer he will bid high for it against other buyers who want the same animal.

In the next pen are two brand inspectors, or cattle detectives. These men, employed by the cattle associations, are familiar with every brand used to mark cattle. If any seller tries to dispose of an animal that does not bear his registered brand, it is the duty of these inspectors to learn how the animal was obtained. This is to prevent stolen cattle from being marketed through the stockyards.

After being passed by the brand inspectors, fed, watered, and allowed to rest for a day or two, our "white face" is transferred, along with several others, to a pen in Packingtown. Now for a short time we must lose sight of him and await his reappearance in the chilling room in the form of two halves of beef, his head gone and his sleek hide

on its way to the tannery. In the chilling room, the animal heat is thoroughly removed from the carcass.

Brown Bros.

In the chilling room. Corn-fed beef in the coolers ready for shipment to the markets of the world

Every carcass in a packing house is examined by United States government inspectors. There are almost four hundred of these officials in Packingtown. All carcasses that are passed are stamped with the United States stamp, which reads, "U. S. Inspected and Passed." This is a virtual guaranty that the meat is wholesome.

For forty-eight hours the carcasses are allowed to remain in the chilling room, which is kept at 36 degrees above zero. A few of these carcasses are sent to the local salesrooms, from which they are sold to the retail meat dealers. By far the greater number, however, are cooled to the desired

temperature, loaded into thousands of modern refrigerator cars owned by the packers, and shipped to distant distributing points.

Only 56 to 58 per cent of the average steer can be sold for table use. This leaves about 43 per cent waste. But this waste has been banished. Probably no other industry has so completely mastered the art of utilizing waste. Even the gallstones of the animals are sold to the Japanese to be made into good-luck talismans. The blood is pressed, dried, and made into blood meal, used in balancing rations for feeding hogs and chickens and in the manufacture of fertilizer.

If your local butcher kills his own animals, as a

Preparing meat for beef broth, one of the important products of a great canning factory. This factory puts up many varieties of high-class soups

few of them do, you may learn from him that he uses only the meat, hide, and brains. If the great

packing houses used no more of the animal than these products, meat would be far more expensive than it is now. But it is only the large killing establishments that are able to provide the facilities for turning every scrap of waste into a valuable by-product. To do this requires large and expensive plants with elaborate equipment.

There is a certain class of butcher who uses only the fore quarters of the steer. This is the shohet, a Jewish Rabbi, who butchers the Kosher-killed cattle, the only meat the religion of the orthodox Jew will permit him to eat.

Now let us follow the halves of our white-faced steer from the chilling room to their final destination. One half of the carcass was sold to a local hotel and was transferred by auto truck to its cold storage room, and was there cut into choice steaks and roasts and served to the guests in a beautiful dining room. The other half of our Hereford was bought by an out-of-town customer. It was loaded into a waiting refrigerator car, and delivered the following morning at a meat market in a town about a hundred miles away.

The tongue of our steer was pickled and its brains were frozen for shipment. The remainder of the carcass not used as meat was put through the various waste-saving processes and came out as by-products.

A large percentage of the meat from lean animals is canned. They are commonly called "scrubs" or "canners." This does not mean that their meat is of an inferior quality, but simply that it contains less moisture and fat and is therefore less tender. So it is more suitable for canning purposes than for steaks and roasts.

Shipping sheep and swine. Now let us see what becomes of the other meat-producing animals sent to the packers. Sheep and swine are often shipped in two-story cars called "double deckers." All live-stock cars are equipped with feeding and watering troughs and must be accompanied on their journeys by attendants, whose duty it is to see that the animals receive proper and humane attention. When the animals reach the stockyards they are transferred into clean, sanitary pens, which are under the constant scrutiny of United States government inspectors.

A Poland China prize winner

Changing hogs into pork. Suppose we follow a hog from the pen through the plant. After being killed, the hog is dipped into scalding water to loosen the bristles, which are then deftly scraped off and started on their journey to be prepared for the brush makers.

A champion Tamworth

Swinging from an overhead trolley rail the carcass, as it passes slowly down the line, is cleaned and disemboweled by various workmen. Each operation is observed by the ever-watchful government inspectors, who reject any animal that does not meet the strict requirements of the law. Carcasses thus condemned are

rendered into inedible grease and fertilizer materials. Those that pass inspection are so stamped and sent on to the chilling rooms.

Now in place of the hog, we have so many pounds of pork. As with beef, this pork may be sold to dealers in country towns, frozen and shipped abroad, sold in local markets, or it may be cured. About as many products are made from its waste as from the waste of a beef carcass.

The history of the sheep passing through Packingtown is much the same as that of the steer and the hog. After he enters the packing plant, his skin is removed and his carcass inspected by the United

In a sausage factory. Here pork that has been changed into sausage is now being stuffed into "casings" and made ready for marketing

States inspectors and then sent to the chilling room, and from there to the trade or else to cold storage.

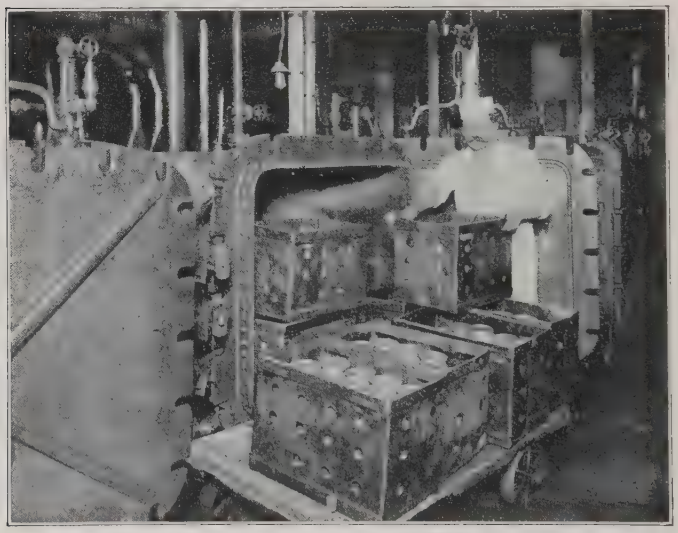
Canned meats for the world. In the heart of Packingtown are establishments which supply canned

Corned-beef tins coming from the vacuum-sealing machine. The filled tins are automatically conveyed to the sealing machine

meats to every part of the world. One plant there received a single order calling for 48,000,000 pounds of corned beef. The raw corned beef we buy at the butcher shop is not the canned corned beef of commerce. The latter is a carefully cooked food which comes from its container ready for the table.

On the top floor of this plant we find the cooking rooms, where stand rows of big iron vats in which the corned beef is cooked. These vats are heated by steam coils. From the basement cutting rooms, a great automatic carrier brings tons of cured beef up to this cooking floor. The meat has previously been cut into strips and allowed to soak for several days in a pickle of salt, saltpeter, and sugar.

When the meat reaches the cooking floor, it is placed in the big vats of boiling water and allowed



A sterilizing tank in a modern meat-packing establishment

to cook until the head chef, who superintends the cooking, pronounces it done. Then it is dipped out into aluminum buckets which travel along an overhead trolley. These buckets automatically dump their loads into a chute which passes the meat down upon aluminum-covered, traylike tables on the floor below, where it is sorted by hand, and the excess fat and gristle cut off. Next the meat goes through a series of cutting machines which cut it into smaller bits of the size desired.

The corned beef is then sent through other chutes to the floor below and there put into cans, which are filled by large automatic machines. One of these machines will fill 22,000 one-pound cans in a day.

There are eight of these can-filling machines kept constantly busy.

Bouillon cubes. This factory also makes meat extract and bouillon cubes from meat scraps or trimmings — not from blood, as some suppose. The scraps are cooked slowly until all the flavor is extracted from them. The liquid is then boiled until it becomes almost solid, when it is known as meat extract. Meat extract and certain vegetable extracts are combined and baked and then formed into bouillon cubes.

Nationalities of Packingtown workers. At the present time the Union Stockyards and Packingtown employ workers from forty-four different countries. If you draw lines on your world map from Chicago to the countries listed below, you will see how many thousand miles many of the men have traveled who work in Chicago's great packing plants.

HOME COUNTRIES OF PACKINGTOWN WORKERS

Alaska
Arabia
Argentine Republic
Australia
Austria
Belgium
Bolivia
Brazil
British South Africa
Bulgaria
Canada
Chile
China
Costa Rica
Cuba
Denmark
East Indies
Egypt
England
France
Germany
Greece
Hawaiian Islands
India
Ireland
Italy
Japan
Kamerun
Mexico
New Zealand
Norway
Peru
Poland
Portugal
Roumania
Russia
Scotland
Serbia
Spain
Sweden
Switzerland
Turkey
United States
West Indies

From this we learn that the meat industry not only furnishes food to all countries but also gives employment to many of their people.

Varieties of canned meats. Have you any idea of the variety of canned meats that can be bought? If your mother had one can of each kind of tinned meat, her pantry would indeed be well stocked, for at least sixty-two kinds are produced. Packingtown alone sends millions of dollars' worth all over the world.

CANNED MEATS PREPARED IN PACKINGTOWN

beef and vegetables
beefsteak and onions
beef suet
boneless chicken
brawn
brisket beef
broiled beef
calves' brains
chicken and tongue
chicken soup
chicken tamale
chile con carne
chipped dried beef
chop suey
compressed corned ham
compressed pigs' feet
consomme
corned beef
corned beef hash
corned pork
deviled chicken
deviled ham
deviled tongue
deviled turkey
frankfurter bratwurst
hamburger loaf
hamburger steak and onions
ham loaf
head cheese
Irish stew
jellied hocks
lamb's tongue
liver and bacon
minced collops
minced steak
New England boiled dinner
ox marrow
ox tails
ox-tail soup
ox tongue
pickled lamb's tongue
pickled pigs' feet
pickled tripe
pork sausage meat
potted beef
potted chicken
potted ham
potted tongue
potted turkey
roast beef
roast beef hash
roast chicken
roast mutton
roast veal
sauer kraut and sausage
sliced bacon, in glass and tin
sweetbreads
tripe
tripe and onions
veal loaf
Vienna sausage
Vienna sausage, tomato sauce

Other packing centers. While we have described Packingtown at Chicago, it should be remembered that there are many other great packing centers in the United States. Among the most important of these are Kansas City, New York, Omaha, Indianapolis, East St. Louis, and Buffalo.

How packers distribute their products. Before studying the different cured meats, let us learn how it is possible for the American packing house to distribute its products all over the world, to sell to the British colonist in South Africa, to the native of far distant Chosen, to the peasant of Northern Siberia.

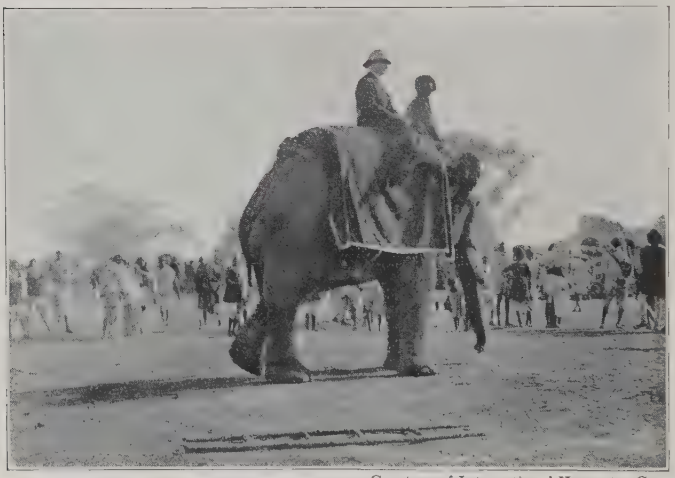
Packingtown concerns have more than a thousand branch houses and offices scattered broadcast over the face of the globe. Under normal conditions, one packing plant alone has about five hundred salesmen engaged in selling its products throughout the United Kingdom and continental Europe. The various governments buy their meat by contracting for so many thousands or millions of pounds of a certain kind, to be delivered within a specified time.

In the principal cities of Europe, South America, and Asia, American packers have branch houses and offices, from which their salesmen solicit business. Thus, meat markets in Paris, Berlin, Vienna, London, Madrid, Stockholm, or any other large European city, are visited by salesmen who draw their pay from Packingtown.

Of course, it would not be good business to send a salesman through the wilds of Africa or India in order to sell a few natives a small supply of corned beef, or into the heart of Siberia to secure orders for a few barrels of fat pork from scattered peasants there. So these sales must be made in another way.

Now suppose little Nickol, who lives on the great steppes in Southern Siberia, between the Irtysh River and Balkhash Lake, has become tired of the goat meat from his father's herd, and longs for another taste of delicious ham like that which his eldest brother had once sent them from Petrograd.

As it is now nearly Christmas and Nickol has worked hard, his father decides to have an American ham for



Courtesy of International Harvester Co.

An American salesman in Asia

their Christ's Day feast. So, the next time he goes to town, he tells the butcher there that he wants an American ham—a big, sweet, American ham. May he have it for Christmas, which is only three weeks away? Yes; the butcher will see that it is on hand before Christmas.

That night the butcher writes to the wholesale house at Omsk and includes in his order the ham for little Nickol. The wholesale house at Omsk adds this to the order which it is sending to the big meat supply company in Petrograd. The Petrograd meat company has orders for many other hams, sides of bacon, and cases of American canned meats, and it telephones to the branch house of an American packing concern, with the result that the meat is

delivered to its plant the following morning. Within two weeks the ham is at the butcher's shop waiting for little Nickol's father to call and get it.

This method of selling applies to canned meats as well as to other kinds of meats. But there are also direct importers in foreign countries who have the goods shipped from Packingtown straight to their own distributing houses.

Cured meats. When we speak of cured meats, we mean those which have been pickled, dried, or smoked. The dried meat of the packer is somewhat similar to the smoked article, whereas the meat dried by our forefathers, by the American Indians and the natives of South America, Australia, and other countries usually was not smoked. The dried beef from Packingtown when sliced and canned is also known as "chipped beef." The large packing houses of this country pickle the meat in brine before smoking it.

The story of ham. As ham is one of the most delicious and popular of cured meats, its story is too important and interesting to be omitted. Hams may be had in three forms: fresh, boiled, and smoked.

The fresh ham is the hip of the hog just as it is cut from the dressed animal. In the preparation of the boiled ham of commerce, the greater portion of the fat is trimmed from the ham, the bones removed, and the skin again tied down over the lean ham. Then it is placed in an enormous "steamer" and thoroughly cooked. After this it is ready for sale.

The smoked ham, of the kind commonly served with eggs, is first placed in a solution of sugar, salt, and saltpeter and allowed to pickle for a period

which depends upon its size. The hams are first sorted and graded into sizes; that is, those weighing eight to ten pounds, for example, will be treated as one size, and those of ten to twelve pounds as another. By this method of grading it is possible to secure a uniform pickle or cure.

After the hams have been properly cured, they are thoroughly washed in automatic washing machines and then transferred to the smokehouses on large iron carriers, or inverted "trees," from which the hams hang without touching one another. These "trees," being suspended from overhead trolleys, are easily shunted about. There are fifty hams hanging on one of these trees as it is wheeled into the smokehouse.

The smokehouses in the plant we are visiting each have five stories and the floors are a steel network. On the bottom floor of the smokehouses, fires fed with hickory wood and hardwood sawdust are smoldering. These fires send up an aromatic sweet-smelling, smoke which gives the hams a delicious flavor. The temperature of the smokerooms ranges from 100 to 130 degrees above zero. A cord to a cord and a half of wood is used in smoking a "house" of meat. Each smokehouse has a capacity of 35,000 hams or sides of bacon, and there are 26 houses in this plant. After leaving the smokeroom, the hams are branded, inspected, and sent to the shipping and packing room. The hams are now ready for the consumer.

Bacon sides go through the same process as that used in curing ham. The bacon is obtained from the breast and sides of the hog, the breast pieces being the choicest.

Pickled and salted meats. There are many varieties of vinegar-pickled, salt-pickled, and dry-salted meats, the most common of which are pickled pigs' feet, pickled tongue, tripe, and salt pork of different cuts. We also have a large export trade in pickled pigs' tails and ears, but these are not generally eaten in this country.

In the curing of dry-salt pork the meat is rubbed well with salt. It is then allowed to stand in vats or in great piles on the clean floor until the salt has drawn the moisture from the meat and thoroughly cured it. A single packing plant salts many thousand pounds of pork each week.

Because of its wonderful keeping qualities, this meat is shipped to all parts of the world. It is used in the tropics because it will not ferment in the heat, and in the polar regions because cold does not affect it. This is generally true of all cured meats, but especially of the salted.

How by-products affect prices. We are told that the world's monthly meat bill amounts to almost $1,000,000,000. The bill would, no doubt, amount to several hundred million dollars more if it were not for the salvage income from the by-products of this industry, which tends to keep down the price of meat.

By-products many and varied. More than eighty different kinds of drugs are by-products of the meat industry. One American plant manufactures over seventy-five medicinal preparations, the most familiar of which, perhaps, is pepsin, extracted from the linings of pig stomachs. Rennet—best known as an essential for curdling milk in the making of cheese—is also a product of this plant.

The leather in the shoes you wear is furnished by this industry. For much of the music you enjoy you are directly indebted to the live stock which contribute strings for musical instruments. Fish lines, strings for tennis rackets, and other like things come from the same source. Even the furniture maker looks to the waste of Packingtown for his glue. Buttons, ornaments, and jewelry in almost endless variety are by-products of the meat-packing industry.

From the following list you will learn that we get many things from the packing industry besides food.

PRINCIPAL BY-PRODUCTS OF THE PACKING INDUSTRY

all kinds of leathers
artificial teeth
beef extract
buttons
candles
canned edible products formerly wasted
combs
crotchet needles
dice
drum snares
fertilizer
gelatine
glue
glycerine
hair for brushes
handles for knives
handles for razors
hair for upholstering
hairpins
imitation stag horn
inedible grease
laundry soaps
musical strings
napkin rings
neatsfoot oil
nursing rings
oleomargarine
pancreatin
pepsin
perfumes
pipestems
rennet
stock feeds
suprarenal — worth more than five thousand dollars a pound
tennis strings
thyroid tablets
toilet soaps
umbrella handles
wool

Oleomargarine or "packing-house butter." One of the most important products of the modern packing plant is oleomargarine. It is often used by those who feel that they cannot afford first-class butter at current prices. It is made of milk solid or butter fat, vegetable oil, neutral, and oleo oil, or

animal fat. Here is an approximate formula of a high-grade oleomargarine, or butterine, as it is sometimes called:

Oleo oil	45 per cent
Vegetable oil	14 per cent
Neutral	12 per cent
Butter fat	15 per cent
Moisture and salt	14 per cent
	100 per cent

Oleo oil, which is made by melting and pressing the finest beef fat, is indisputably wholesome. So is the vegetable oil. The finest quality of lard, which contains nothing impure or harmful, is known as a base for many medicinal preparations, besides serving as a body for oleomargarine.

Moisture is necessary for the working of the oleomargarine, and salt is used to add flavor and improve the keeping qualities of the food. Oleomargarine comes out of the churn snowy white in color. If coloring is added before it is sold to the consumer an additional tax is levied upon it by the United States government.

The world's annual production of oleomargarine is between 1,500,000,000 and 2,000,000,000 pounds. Of this amount, America produces about 145,000,000 pounds. England and Germany consume nearly half of the world's total output of this food. In Denmark, a land long famous for its fine butter, an average of 25 pounds of oleomargarine to the person is eaten each year. Holland, another dairy country, consumes 20 pounds a year per capita. In the United States, the average per capita consumption of oleomargarine is only 1.5 pounds a year.

Chapter XIII

THE WORLD'S COMMERCE IN MEATS

Meat eating and national character. Many students of national traits tell us that the tendencies of a people may be read in the figures of their meat consumption. They insist that the kind and amount of meat eaten by a nation reveals the general character of its citizens and serves as a kind of thermometer of national temperament. Other equally able thinkers say that this conclusion is altogether too radical. They contend, instead, that the meat consumption of a country is really an index to the health of its people, and especially to the increase in density of its population.

Whether either of these theories is correct or incorrect, the fact remains that "meat figures" are full of meaning, although the difficulty of obtaining reliable statistics has proved to be quite as great as the importance of the subject.

The story figures tell. Until the United States Department of Agriculture made an extensive investigation of the world's production, distribution, and consumption of meats, few dependable facts in this field of information were available. Through the special courtesy of the Bureau of Crop Estimates, there is given in this chapter what are probably the most authentic and vital "meat figures" thus far made public.

Usually figures make rather dry reading, but this time the common rule is reversed, for the figures tell a story so big, so new, and so important that

no thoughtful person can fail to be interested in what they reveal. In order to make these statements seem much more real and important, it is suggested that when you come to a line of figures, you try to see in their places the actual things for which they stand.

Our supply of beef, mutton, and pork. There are more than 61,000,000 head of cattle on United States farms. If these cattle were placed in a line side by side, as close together as they could stand, this line would stretch around the world and still leave more than enough to extend from Maine to California. Yet, strange to say, we are forced to import cattle. In the year of 1913 we brought in almost 500,000. Although we eat more meat than any other nation, we do not by any means consume all the animals that we raise and import. If equally divided among the inhabitants of the United States our total meat consumption would amount to 170 pounds a year for each person. No other country in the world sells as much meat as the United States. In one year we sold to other nations about 2,500,000,000 pounds of beef, mutton, and pork.

Our farmers also have almost 68,000,000 head of swine. It is unnecessary for us to import swine save for foundation stock. There are about 50,000,000 sheep on our farms and we import about 15,000 a year for choice breeding stock and over 100,000 for consumption. Of course, not all the live stock of this country is on farms or ranches. There are almost 400,000 sheep not kept on farms or ranches, and about 2,000,000 head of cattle in the villages, towns, and cities throughout the United States.

Demand for foreign meats. Although we raise and export a great amount of meat, there is a

Eugene J. Hall

A few of the sixty-eight million swine on the farms in the United States. Although we raise our entire supply of fresh pork, we import many million pounds of smoked hams and other specially prepared meats

constant and growing demand for certain foreign prepared meats. We import more than 200,000,000 pounds of dressed meat a year. To get a clear idea of these imported meats you have only to visit a well-stocked delicatessen store and look at the smoked hams and other specially prepared meats, contributed to our tables by the nations of the Old World.

The Argentine stands third in the production of cattle, second in the production of sheep, and second in the exportation of meat. While this country consumes only about one twenty-fifth as much meat

as the United States, its population is so small that its per capita consumption stands high in the list, the average consumption there being about 250 pounds per person a year. From the harbor of Buenos Aires, its capital, largest city and chief port, thousands of boats are engaged in carrying meats to all parts of the world. More than 1,000,000,000 pounds of meat is exported from this city in a single year. This includes a great quantity of frozen mutton sent to Europe, especially to the United Kingdom.

Stock raising in the Argentine. On the broad, grassy pampas of the Argentine, 29,500,000 cattle and 80,000,000 sheep are being raised to feed the people of many countries. The ranches of the Argentine are raising cattle and sheep, not only for their own use, but for those countries which are not able to produce enough meat to meet the needs of their own inhabitants. But the live-stock industry of the Argentine is not limited to cattle and sheep. It is estimated that the country has 3,500,000 hogs.

Australia as a meat-producing center. The only country which raises more sheep than the Argentine is Australia. There are more than 85,000,000 sheep in Australia, and its neighbor, New Zealand, has 24,000,000. The grassy steppes of Eastern and Southeastern Australia furnish pasturage for many million sheep and cattle. Here the government leases sheep ranges to the ranchers. Although Australia is about the size of the United States, there is a large area covered with mountains and deserts too barren and unproductive to furnish profitable pasturage.

Because of the great numbers of sheep and cattle raised in Australia, the diet of its people is chiefly

meat. Australians eat more meat per person than do any other people. Their average consumption is 262 pounds a year, with the Argentine a close second. The people of New Zealand rank next as meat eaters, with an average consumption of 212

Brown Bros.

An Australian sheep ranch. There are more than eighty-five million sheep in Australia, and because of the great number of sheep and cattle raised the Australians eat more meat per person than do any other people

pounds a year each. Next comes the United States, where the average consumption is 170 pounds of meat a year for each man, woman, and child.

Yet the people of the United States consume more than fifteen times as much meat a year as do those of Australia and we export almost three times as much. In one year Australia exports about 425,000,000 pounds of meat, less than one third of which is mutton.

From what seaport do you think the greater part of the Australian meat is shipped? Find the eastern steppes of Australia and then you can tell.

Stock raising in Germany. Germany is the fifth largest cattle-raising country in the world. Before the opening of the great European war the estimated number of cattle within its borders was more than 20,000,000. In normal times Germany usually has more than 5,500,000 sheep and about 25,500,000 hogs, being surpassed in the production of swine only by the United States. But being the second largest consumer of meat, using 7,500,000,000 pounds yearly, Germany has found it necessary to become the second largest importer of dressed meat and live animals. This nation has been buying from other countries more than 500,000,000 pounds of meat and almost 350,000 cattle, sheep, and hogs yearly. Yet you should be reminded that Germany's meat exports are small and that the German people use fish to a large degree in place of meat. In fact, they are not large meat eaters. The nation is classed eighth in per capita use of meat, the average consumption being less than 112 pounds a year to the person. Germany's immense population accounts for the fact that while her meat consumption is exceeded in volume by that of only one nation, her per capita use of meat is low.

How England is fed. We are told that if the people of England could not get food from other nations, they would starve within six months. This, of course, is because the country is so thickly populated that the soil cannot produce food enough to feed the inhabitants. So England, being dependent upon other countries for her food supply, is naturally

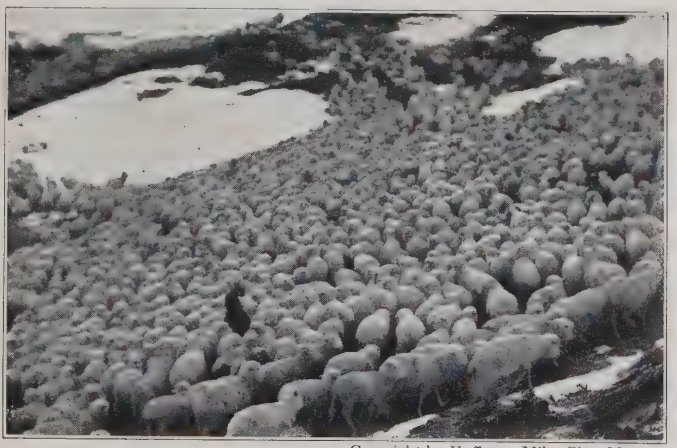
the largest importer of foods of all kinds. The only food of which England has a sufficient supply is fish. But if her people were forced to live entirely on fish, supposing that were possible, they would soon learn that the waters about them could not meet the demand made upon them.

The United Kingdom consumes in one year about 5,175,000,000 pounds of beef, mutton, and pork. The United States, Germany, and Russia are, in fact, the only countries eating more meat than the United Kingdom. The latter stands seventh among the nations of the world in per capita consumption of meat, its average being 119 pounds to the person.

But England has colonies that produce great quantities of meat and other food supplies for her. Of the 2,985,000,000 pounds of meat imported by the United Kingdom in one year, many million pounds came from its colonies, especially from Australia and New Zealand. South Africa, Canada, and even India also contribute largely. But the 2,985,000,000 pounds of meat imported in one year is not all the meat the United Kingdom has had to buy from other countries. To this must be added about 64,000 live cattle and sheep.

Meat supply and increase of population. There was a time when the European countries, which are now importing billions of pounds of meat each year, were raising more meat than they really needed, just as our western plains once grazed many more cattle than we needed for our own consumption. But as the population of a country increases, the land as a matter of course is divided into smaller units. Then open ranges and ranches become cultivated farms devoted to field crops and to gardening. Villages replace the farms and gardens and the

villages in turn grow into towns and cities. So the cattle or sheep range of to-day is the farm of to-morrow and the city of another year. That is why,



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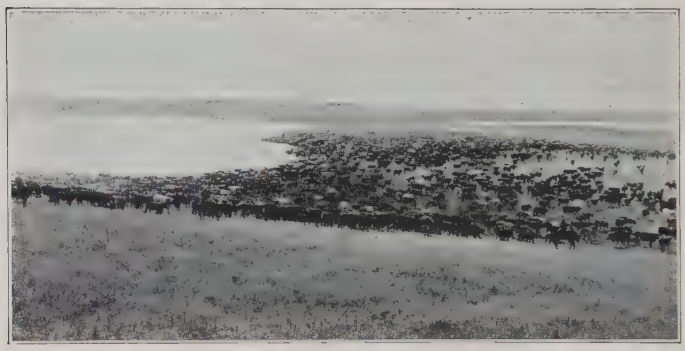
Sheep on a range in Montana. The rapidly increasing population of the United States has transformed most of the great sheep and cattle ranges into cultivated farms, villages, towns, and cities

within a short time, Russia and the Argentine will be selling much meat to the countries that now look largely to the United States for their supply. But the United States is capable of producing a great deal more meat than she now turns out, so it will probably be a long time before we are forced to look to other countries for our own supply.

In certain European countries the flesh of the horse is eaten. Germany, for instance, in one year ate more than 120,000,000 pounds of meat other than beef, pork, and mutton. This included game, of course, but in European countries game is not abundant enough to make much difference in the total meat supply.

How Nature affects cattle raising. If we were to take a geography and attempt to determine where



Range cattle in Western Canada, a part of the world highly favorable for the production of live stock

most of the world's cattle are now raised, and where they are likely to be raised in a few years, we would find several important things to be considered. First, there is population. It is practically impossible for a densely populated country like England to raise enough cattle to feed its own people, although the number of cattle to the square mile in such a country may be large. England has about 667 persons to the square mile and 10.4 cattle. The Argentine has about 7 persons and 27 cattle to the square mile. In the United States there are about 33 people and 20 cattle to the square mile. Second, the physical features of the countries have much to do with the raising of live stock. For instance, stock cannot be raised in the deserts of Africa as it can upon the rich and fertile prairies of the United States or on the grassy pampas of the Argentine.

Third, there are countries where the climate makes it practically impossible to graze cattle, sheep,

or swine. In Northern Canada and Northern Siberia, the intense cold makes the raising of these animals impossible. Also, there are countries where it is too hot and too wet to raise live stock, and where insect pests are a standing peril. Fourth, there is vegetation. In the hot, damp countries swamps and jungles abound which offer practically no pasturage to the domestic animals of our plains. In the Far North grow grasses and moss that will sustain reindeer but not cattle. In certain parts of the Sahara vegetation occurs which will nourish the camel, but on which our stock could not live.

So we find that there are parts of the world highly favored by nature for the production of live stock. It is to these countries that the world is now looking for its supply of meat. Suppose you make a list of ten countries which are especially well supplied in this respect and then learn how many people there are to the square mile in those countries.

Chapter XIV

VEGETABLE OILS

An important food element. Oils and fats form one of the most important parts of our food. Many of these, such as butter and fat meats, are obtained from animals, but many others come from vegetable products. These last, because less expensive than animal fats and oils, are becoming more and more important as a part of our daily diet.

Chief among the fruits and seeds that yield edible oils are olives, peanuts and other nuts, corn, and the soy bean.

Olive oil. There are a great many varieties of olives. Those used for the purpose of making olive oil are produced chiefly in Italy, France, Spain, and California.

If your father's apple or pear trees were to bear only every second year he would be greatly disappointed. Yet this is all that the growers of the olive can expect. The fruit comes but once every two years. The tree flowers in the spring and the fruit appears toward the end of July. The olive is green until it attains full size. Then as it ripens it gradually turns from green to yellow, and by November, when the harvest begins, it is a rich purplish brown. The picking lasts until spring, although the best oil is said to be secured from the olives gathered in January and February.

After being picked, the olives, in order to make the fruit give up its oil more readily, are spread out and slightly heated for about twenty hours. Next

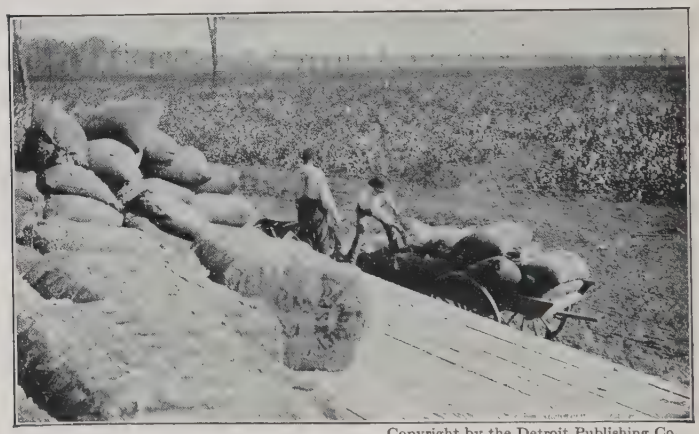
they are ground into a pasty mass which is subjected to heavy pressure until all the oil is extracted.

An ancient olive press in Spain. This old stone press, which dates from the time of the Romans, is still used to crush olives for making oil

The use of olive oil as a food is rapidly increasing in this country. It is over thirty times as nourishing as beef soup and twenty times as nourishing as milk. It is generally superior to lard or butter for cooking purposes and it is less expensive.

Most of the olive oil imported into this country comes in large casks or hogsheads and is put into cans and bottles after it reaches the United States. There are also many gallons imported each year in bottles and cans. Some of the largest wholesale grocery houses and other importers have the oil bottled in France and Italy and Spain especially for their use and under the supervision of their agents. In a normal year Italy sends us 4,000,000 gallons,

France nearly 1,000,000 gallons, and Spain about 350,000 gallons. California alone makes more than



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Hauling cotton seed to the railway station. Cotton seed, which until recent years was practically a waste, now makes the cotton plant a valued food producer as well as an important factor in the clothing of mankind

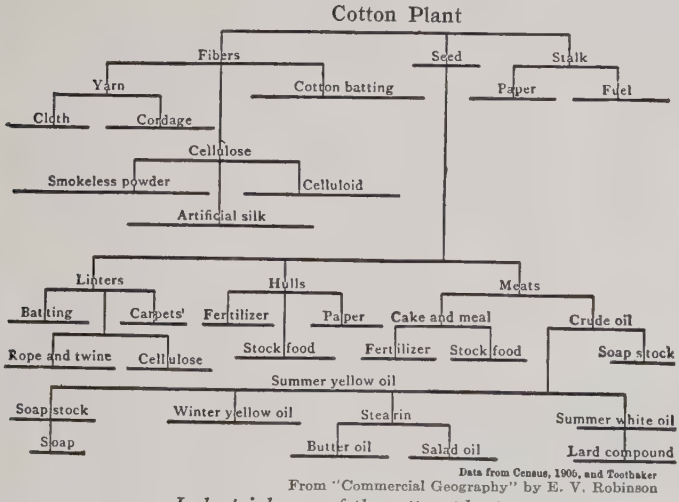
200,000 gallons and is making more each year. The finer grades of California olive oil are noted for their flavor and purity.

Cottonseed oil. Less than a hundred years ago the cotton growers of the world found it difficult to dispose of the seed cleaned from the "lint" or cotton. Until recent years the seed of the cotton plant was practically sheer waste. But to-day the oil pressed from the seeds of the average American cotton crop is an important addition to the food resources of our country, being valued at about $100,000,000.

Thus many million dollars each year are snatched from the waste heap and turned into the pockets of the growers and handlers of our cotton crop. But

the fact that the cotton plant, which has for centuries done so large a share of the work of furnishing the clothing for mankind, has added to its usefulness by joining the ranks of the food producers is possibly still more important.

The contribution of the cotton plant to our food resources is not, however, confined to the wholesome oil taken from the seed and directly consumed by man. The pulp from which the oil has been pressed has become one of the staple foods for the fattening of live stock, especially in the South, and millions of tons, in the form of cottonseed cake and meal,



From "Commercial Geography" by E. V. Robinson

Industrial uses of the cotton plant

are used for this purpose each year. Great quantities of this by-product are also used in the manufacture of fertilizers for the feeding of crops.

Making cottonseed oil. In expressing or extracting cottonseed oil, the seeds are thoroughly cleaned,

then crushed in machines resembling those in sugar-cane mills. This pulp is then put into woolen press bags and subjected to strong pressure. After the oil has been extracted, that which is left is called cottonseed cake.

The oil from the presses is pumped into large tanks, from which it is either sold in the crude state or passed on to the refiner. In the refinery, caustic soda is added at a temperature of from 110° to 120° F., with the result that the undesirable fatty acids are neutralized and drop to the bottom of the mixture. The oil is then washed free of this substance and allowed to clarify. It comes out of the clarifier a beautiful lemon yellow.

Cottonseed oil is used in the packing of sardines and other products; as a substitute for olive oil in cooking; and in combination with olive oil for salad dressings. It is also used as a lubricant for machinery.

Compounded lard is manufactured from cottonseed oil and the lower grades are used in making soap. The seed yields a maximum of about 35 per cent oil.

Cottonseed oil exports and imports. Cotton is grown mainly in the United States, Egypt, India, and South America. Cotton seed is exported from all these countries to Europe, where it is made into oil.

According to United States government figures, in a single year this country exported 47,457,000 gallons of cottonseed oil; in the same year the United Kingdom exported 6,099,000 gallons and Belgium exported 1,341,000 gallons. But in the same year the United Kingdom imported 7,587,000 gallons and Belgium imported 2,876,000 gallons.

This means that the United Kingdom and Belgium raise no cotton but simply act as refiners of cottonseed oil.

The largest consumers of the oil are Germany, Italy, and France. In one year Germany imported 7,900,000 gallons, Italy 5,388,000 gallons, and France 3,697,000 gallons. Of these three countries, France was the only one to export any considerable amount of cottonseed oil, sending 172,000 gallons abroad.

Nut oils. A wide variety of nuts are important as the source of large quantities of oils. The oil pressed from the raw peanut ranks commercially with cottonseed and olive oils. It is used in making oleomargarine, and to take the place of butter and lard in cooking. It is also valuable in the packing of olives and sardines. Large quantities of oils from the almond, the coconut, and the walnut are used in cooking and confectionery, chiefly as flavoring. Other nut oils are those secured from beech nuts, Brazil nuts, ground nuts, and hazel nuts.

We used to import most of our peanut oil from France and Germany, where great quantities of African peanuts are pressed for oil each year. But in late years American peanut growers have learned the value of peanut oil and we are now producing large quantities of it. A bushel of peanuts weighing thirty pounds will yield about a gallon of oil. While the African peanut in the amount of oil it contains is richer than our southern nut, yet American peanut growers are finding the cultivation of peanuts for oil a profitable business. The production is now about 40,000,000 bushels a year but this does not supply the demand.

Corn oil. Corn oil, an increasingly important item in our food supply, is made from the germ of the Indian corn kernel. In the making of corn products, starch, sirup, sugar, and gluten, the germ, which contains a large proportion of oil, is separated from the remainder of the grain. These germs are dried, ground, and then pressed to secure the oil.

By refining and filtering, a valuable oil is produced. useful as shortening for bread and pastry, for frying and cooking, and as a salad oil. The unrefined oil is used in the manufacture of soap, lubricating oil, and a substance that can be used as a substitute for rubber.

In the United States we make about 75,000,000 pounds of corn oil and 90,000,000 pounds of corn-oil cake a year. The corn-oil cake, which is made from the substance that remains after the oil has been pressed from the germ, is a valuable food for fattening live stock.

Bean oil. An important source of oil that has come into notice in recent years is the soy bean, a product originally grown in Eastern countries, especially in Japan, China, and Chosen. The plant is an annual, growing chiefly in bush form with a tendency to climb. It bears pods containing from two to five beans. The beans vary in color, but are chiefly yellow, green, and black. The plant is raised successfully in the United States, in North Carolina, Tennessee, and other southern states, where it is grown with corn. Besides being of great value as forage, the plant resembles peas, beans, and alfalfa in its nitrogen-storing properties and hence is valuable as a soil improver.

Soy bean oil is imported from China, Japan, and

India. Its value as a substitute for lard in cooking and as an ingredient in the manufacture of salad oil

Soy bean oil awaiting shipment at a Manchurian port. Soy bean oil plays an important part in the food supply of both Chinese and Japanese

and oleomargarine is being recognized more and more. The plant is marvelously prolific and the oil so valuable that agricultural and commercial circles in the United States are now devoting increasing attention to the cultivation of the plant. The oil cake that remains after the oil has been pressed from the bean has proved a valuable food for dairy cattle. The use of bean oil in the United States and Europe in the manufacture of oleomargarine and salad oil is steadily increasing. The oil is extracted in much the same way as olive oil. The beans are crushed, heated slightly, and then subjected to steam pressure. Soy bean oil, in various degrees of refinement, can be put to the same uses that other vegetable oils are put. It may be used as a lubricant, as an

illuminating oil, in the manufacture of soap, and in making a substitute for rubber.

In Eastern countries the beans themselves are an important food resource. They are eaten boiled with meat. They are made into a meal which is used in bread making. A sauce known as *shoyu* or soy sauce is made by boiling the beans with an equal quantity of barley, then allowing the mass to ferment, after which it is salted and strained. This product is an important ingredient of certain popular meat sauces.

Chapter XV

FREE FOOD FROM MANY WATERS

Perils of the sea fishermen. Romance, mystery, and adventure hang as thick as a Newfoundland fog over the whole fishing industry. It is not too much to say that probably more perils attend the work of taking the fish from the seas and the great inland lakes than surround any other food harvest.

The loss of life in this calling is large. Hardly a season passes that does not show the sacrifice of several ships with their brave crews. Often whole fleets are swept away by the fury of a single storm. Adventure follows close in the wake of every fishing smack that puts out to sea, and there is scarcely a seasoned fisherman in any crew who has not had many thrilling escapes from death and suffered severe hardships from exposure.

In fact, the everyday life of the fisherman, even in fair weather, would seem to the landsman decidedly hard, for the wind which to him would be a furious gale is held by the crew of a fishing smack to be only "brisk." Even though peril, exposure, and narrow escapes are taken by the fisher folk as "all in the day's work," it seems only fair to recall all this when a delicious piece of cod, mackerel, herring, or halibut is placed on your plate at the family table. You may say to yourself, as you eat a bit of such a fish:

"No doubt there is a story of adventure—a good one, too—behind this fish. Did it come from American waters, or was it caught somewhere off

the coast of Europe, or did some brown or yellow man take it from the teeming waters of the Pacific?"

The salmon catch is taken immediately to the canneries which are always built at the water's edge to save loss of time in transportation

Wherever it was, the men who braved the deep sea waters to get it knew the wild fury of storms so terrible as to test the courage of the most heroic.

Some of the most stirring and powerful stories in all literature deal with the dangers of the fisherman's life. Among sea tales that depict their perils and hardships with wonderful vividness is Kipling's ***Captains Courageous.***

Fishing an inherited calling. Many boys along the North Atlantic coast, in New England, Nova Scotia, New Brunswick, Newfoundland, and Labrador, are eagerly awaiting the time when they will be allowed to make their first trip with the fishing fleet. The very dangers of this life make it all the more alluring to the lad who has inherited from a long line of fishermen a generous share of courage, ambition, and pride in the calling, coupled with a love of the sea. He is not easily turned from following in the wake of his hardy forefathers, who have made the family name, locally at least, famous by their skill and daring.

Among the fisher folk of Holland, Norway, Sweden, Scotland, England, and Ireland, it is more than probable that the son of a fisherman will spend his life on the waters where herring and mackerel swarm. For the boys of these Old World nations are not so free to pick and choose their lifework as are American lads. The son usually follows the calling of his father with little thought that anything else might be more to his liking. Certainly there is always a strong likelihood that any normal boy who has heard from father, grandfather, or uncle the stories of great catches, of clever seamanship, of wild storms, and of plucky escapes from perils of every sort, will be tempted to follow this exciting calling.

Often the only tangible property a fisherman can leave to his family are the tools of his trade —the fishing boat, the nets, lines, and hooks with which he has earned a livelihood, and in which the surplus of a thrifty lifetime has been invested. It is only natural then, when the father dies or grows

too old to work, that the family should look to the son to take up the business and make the most of it.

From the Agricultural Yearbook

Frozen halibut in a Pacific coast plant which freezes three and a half million pounds of fish each year

So whenever you eat a piece of herring, or mackerel, or cod, it may add something to its flavor if you will stop and think that the son of the man who hauled that particular fish from the sea is anxiously awaiting the time when he can go out and follow the calling of his father, just as you expect, perhaps, to become a storekeeper, a railroad man, a farmer, or a lawyer. If you could talk with the lad in the Labrador fisher's hut, the sturdy Dutch boy whose thatched cabin stands just inside the Holland dykes, the Norwegian, the Scotch, or the Irish boy whose father has always put out to sea when the herring were due, you would probably be surprised to learn that he looks with pity upon any boy who is to follow

a less splendid and exciting life than that of the fisherman.

Food for rich and poor. Fish is the poor man's meat and the rich man's delicacy. In many localities it is the cheapest flesh food sold; on the other hand, many of the most costly delicacies served at the tables of the wealthy are taken from the world's waters. For example, good frozen fish is delivered at the doors of settlers in the Northwest at a cost of three or four cents a pound, while in the larger cities, to which the chief supply is sent, brook trout may seldom be had for less than a dollar a pound, frequently being retailed for two dollars.

In the districts close to the seas, lakes, and streams

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A bait boat on the Atlantic coast. An offshore fisherman buying bait for the day's fishing

which abound in fish, this food is the chief meat diet of the poor. Thousands of families in such localities

consider any other kind of meat a luxury to be tasted only a few times a year.

Protein at a bargain. To those who have meat on their tables every day, the cheapness of fish means little. But in homes where the cost of fresh meat is beyond the reach of the family purse, except on holidays, this food, freely given up by the waters, means health and happiness. Without it thousands of men, women, and children would be badly nourished. They would not have the strength to do the hard, rough work which falls to their lot, and their chances of bettering their condition would be gone. The nourishing power of fresh fish is from 2 to 4 per cent less than that of meat. But as fish is much cheaper than meat, fish is the real "bargain" when the amount of actual nourishment which one may buy for ten cents is considered. In writing on the subject an eminent Canadian authority has this to say:

"Market cod can usually be obtained, in Ottawa, for 8 cents per pound, or less. It contains 11.1 per cent protein, so that one pound of protein would cost slightly more than 72 cents. Beefsteak contains nearly 15 per cent protein and would be considered moderate in price at 20 cents per pound. At this price one pound of protein would cost $1.33. Fresh haddock contains 8 per cent protein and usually sells in Ottawa for 8 cents per pound. One pound of protein purchased in the form of haddock would thus cost $1.00, and in halibut selling at 16 cents per pound, $1.045, whereas one pound of protein purchased in the way of mutton chops at 20 cents per pound would cost $1.54."

Relative cost of meat and fish. In England, Germany, and almost all European countries, not nearly

enough meat-producing animals are raised to supply the people, and meat must be imported from countries where cattle, sheep, and hogs can be grown cheaply. This fact makes the meat expensive. On the other hand, these countries are close to the seas which abound with fish free for the taking. Let us see what this means to the poorer people of these lands.

At a time when beef was selling in Berlin for 16.5 to 19 cents a pound, fresh mackerel could be bought there for from .8 to 1.1 cents a pound, whiting for 1.4 to 1.6 cents, and cod for 1.7 to 4.9 cents per pound.

Now consider canned salmon, which may be bought anywhere. Here is what the Bureau of Fisheries of our own government has to say about the food value of this fish:

"One pound of canned red salmon of the best quality will cost about 16 cents. (The prices are the average retail prices in Washington, D. C., February 10, 1914.) The same quantity of bone-, muscle-, blood-, and brain-building material and body fuel in other foods would cost:

Eggs, strictly fresh (at 34 cents per dozen)	36 cents
Steak, sirloin (at 27.5 cents per pound)	33 cents
Mutton, leg (at 19 cents per pound)	32 cents
Chicken, average (at 25 cents per pound)	21.5 cents
Ham, smoked (at 18.5 cents per pound)	13.5 cents
Pink salmon, canned (at 9 cents per can)	12.5 cents

"The best grades of canned salmon are richer than meats in body-building materials and contain about the same amount of fats. Pink salmon, which is a cheaper grade, is better than meats for making flesh and bone, but has less fat. Either is as digestible as the best sirloin steak, there is no waste, and nothing has to be thrown away except the can."

The fact that the prices of meats have changed greatly from these figures makes little difference, for it has been found that, as a rule, fish prices change with those of meats and that usually there is about the same difference between them. In other words, fish, which is almost as nourishing as meat — in some cases more so — is almost always cheaper than meat.

Realizing the importance of the fishing industry. It is difficult for a boy or girl living inland to form

Brown Bros.

Drying nets at Jackfish, Ontario, an important fishing town on Lake Superior

any true idea of the bigness and the importance of the fishing industry. The only way to get such a realization is to visit a great fish market or to watch the unloading of a boat just returned from a fishing cruise. When you read that the fishermen of Great Britain catch almost 3,000,000,000 pounds of this rich and delicious food a year, and that the value of this great catch is from $65,000,000 to $75,000,000, it doesn't mean much to you. But if you could spend one hour in one of the great fish

markets in any large city near the sea and look upon a tiny fraction of the total catch, you would understand that fish is not a trifling sort of food to be tasted at a course dinner or to be eaten on Fridays only.

After such a sight you would always spell "fish" with a big capital. Also you would be very thankful that the sea, the lakes, and the rivers of the earth are stocked by Nature with a supply of food so generous that the poorest may have it on their tables when beef, pork, mutton, and other meats are beyond the reach of their slender means.

Still another cause for thankfulness is the fact that the fish are widely distributed throughout the waters of the world. Of course there are many lakes and rivers in thickly settled regions that have been "fished out." But the seas, the large inland lakes, and the rivers still abound with millions upon millions of fish.

It is a mistake to think that because fisheries are free, there is no expense connected with the capture of the fish. The actual cost of operating a fishing schooner is considerable and losses of many kinds often occur. All this must be taken into consideration in the price the fishermen ask for their catch.

A city fish market. If you are fortunate enough to live where you can visit a retail market that sells only fish and sea foods, by all means do so. It will give you a graphic view of the geography of the world's waters, so far as the food that they furnish is concerned. To make sure that you understand what you see it would be a good plan to invite your teacher to go with you. Such a trip, especially to

a large market in a big city, will be one of the most delightful outings you could possibly plan.

What was seen on a recent visit to a fish market in Chicago may give you a good idea of what an interesting affair such an exploring party may prove to be. Every day this special market receives shipments of fresh fish from all parts of the country, and the counters and tables are so arranged that the

Packing sea foods for shipment to city markets and inland towns

fish may be displayed to the best advantage. The tops of these display tables are great trays, kept half filled with chipped ice. On these were placed multitudes of fish, each fish occupying sufficient space to enable the buyer to examine it carefully. Above the counters were signs indicating from what place the particular fish then on display came. One of these signs read "Pacific Delicacies," and on the table were beautiful salmon fresh and frozen, or a dozen or more of the giant Pacific coast crabs, a

shipment of delicate little sandabs from San Francisco, and a number of beautiful trout from the Puget Sound country. These happened to be the special features for the day.

On another table carrying a placard which read "Fresh Water Fish," were dozens of pike, pickerel, black bass, muskellunge, trout, perch, sunfish, eel, carp, and cisco. There were a dozen or more white-aproned clerks busily waiting on a host of eager buyers. When asked from where all those fish came, one of them said, "Some came from the many fresh-water lakes of the Northwest, some from central New York, and some were taken from the waters of the Rocky Mountains."

Over still another counter hung a sign which read "Sea Food from the Atlantic Coast." Here were found cod, herring, haddock, halibut, sea trout, shad, lobsters, sea bass, flounder—a queer flat fish with its two eyes on one side of its head—and a bewildering array of other interesting fish.

Among these were red fish, trout, sheepshead, pompano, shrimp, red snapper, and sea turtles from the South Atlantic and the Gulf of Mexico, each beautiful in its way. On other tables were butterfish, bluefish, striped bass, crappies, scallops, bloaters, crabs, periwinkles, frog legs, oysters, and clams.

Edible seaweed. But fish and shellfish were not the only foods that make this store attractive, for there were on display various seaweeds such as dulse, kanten, kelp, laver, and carrageen.

Dulse is an edible seaweed found on the North Atlantic coast. It is dried in the sun and eaten uncooked as a relish, or boiled in milk and served as a vegetable or eaten with fish. Kelp is another

seaweed found on both the North Pacific and North Atlantic coasts. It is also known as bladder weed, or giant bladder weed. It sometimes has leaves forty feet in length. Kelp is used in making the Japanese soup called "kombu." Laver is a seaweed found on both coasts. In Scotland and Ireland it is called "sloak" or "slook." It is boiled and served with butter, pepper, and vinegar, and by those who like it is considered a great delicacy.

Kanten, a curious Japanese food, is a kind of gelatine. Great quantities of this gelatine are made from the gelidium family of seaweed. It is white, transparent, and has neither taste nor odor. In Japan it is used not only in making jellies and soups, but in clarifying saké or rice spirit. Two or three million pounds of it are exported to this country every year for thickening jams, jellies, ice creams, and other table delicacies. Gelidium seaweed grows largely on the Pacific coast of the United States.

Carrageen, or Irish moss, as this well-known seaweed is more commonly called, owes its name to a town on the coast of Ireland. But most of that found in our markets is from the shores of New Hampshire and Massachusetts. While carrageen is used in various ways, a large part of the product is utilized in making blanc mange and jellies.

Remember that all these foods were in stock at one time in one retail store, so you see the lover of fish may have a different kind every day for months if he wishes.

In addition to the fresh fish, this store carries all kinds of imported fish in cans, pickled, and in brine. Every week it sells thousands of dollars' worth of fish, and its sales are constantly increasing.

Chapter XVI

FISH FROM HOME AND FOREIGN WATERS

Fresh- and salt-water fish. The people of the United States consume many thousand pounds of imported fish each year, in addition to great quantities of domestic fish from both salt and fresh waters. Our imports cover a wide range, from the bundles of dried stockfish from Norway to the tiny bottles of pepper-stuffed anchovies from France, and the tubes of sardellen or anchovy paste from Germany.

In the fish market of a large department store the writer saw a man make four purchases which instantly brought to mind pictures of the remote parts of the world from which they had come. One pound of smoked halibut came from the icy waters of Alaska; a bottle of French anchovies, from the sunny Mediterranean; a dried herring, from the picturesque fiords of Norway; and some California crabs, from the Pacific coast.

A second customer bought some spiced herring from a cask. This herring came from Holland, although it had been spiced in this country. Its home had been the North Sea.

Herring and where we get it. Herring is an important fish. In a single year we imported more than 76,000,000 pounds at a cost of more than $3,000,000. We bought 36 per cent of this from Scotland, 26 per cent from the Netherlands, 14.5 per cent from Norway, 10.5 per cent from Canada, 9 per cent from England, and 4 per cent from Asia. Besides what we import, many

million pounds of herring are caught by our own fishermen off the coasts of Newfoundland. Some

Courtesy of the American-Scandinavian Review

Röst, a fishing village, Lofoten Islands. Along the shore the stockfish and nets are spread out to dry

of our more daring fishermen sail their boats far north into the cold waters about Iceland and fish alongside the Scotchmen, the Scandinavians, and the Dutch. Many dangers are braved in those waters, and little John, in Maine, may be looking anxiously seaward for the return of his father, whose boat is perhaps within hailing distance of that which carries the father of little Olaf in Norway.

The Norwegians take steamers to Iceland, where they catch and pack fish. These fish usually are taken back to Norway, whence they are shipped all over the world. But one time when some Norwegians, who were fishing in Iceland waters, were anxious to get flour, they loaded thirty-four hundred

barrels of herring and some wool on the steamer "Hermod" and shipped it direct to New York, where the arrival of the fishing vessel created no little excitement. At New York the boat was reloaded with flour and immediately sailed for home.

Marketing herrings. Herrings are sold in many ways—fresh, salted, pickled, canned, and smoked. The Great Lakes abound in a whitefish known commercially as fresh-water herring. These great lakes yield annually about 150,000 half barrels of herring, most of which are salted. There are many salting plants on the lakes, especially along the Lake Superior coast. Duluth is the chief shipping point for these fish. After being dressed and "boned" the herring is from five to twelve inches long and is packed in ten-pound boxes. Herring roe—or a mass of fish eggs—is also packed in America. It is taken from herring caught in Chesapeake Bay and in the mouths of rivers in Virginia and the Carolinas. Roe is usually sold in two-pound tins.

Newfoundland bloaters. Bloaters are smoked herring. The fish are caught largely off Newfoundland and Nova Scotia. The fishing vessels go there in November, the best herring being found from October to March. The catch is dumped into the hold of the vessel and covered with salt. The vessels are then brought to Gloucester, Massachusetts, where their cargo is washed in warm water. This removes the dirt and salt from the outside of the fish and also extracts a good deal of the salt from the flesh itself. The herring are then smoked and packed in boxes. The boxes are of two sizes, one containing fifty fish, the other one hundred.

The best grade of bloaters is selected from the top of the cargo and from herring carried in barrels

Brown Bros.

A familiar scene at Gloucester, Massachusetts. Here are thousands and thousands of salted codfish spread on flakes to be cured by the sun

on the deck of the vessels. They are called fancy bloaters, and are so tagged. These are the same quality of herring as those packed in the hold of the vessel, the difference being that they are handled in a special way.

Other kinds of herring. The fish market also offers us a delicacy known as the Bismarck herring, which comes from Germany. Baby herring, two or three inches long, are canned with wine and find ready sale in this country. The so-called Russian sardine is really a small Norwegian herring with its head cut off. These fish, which are sent to us from Germany, are put up in pails with spices and vinegar.

In Norway there are large canneries that pack herring for export to this country. From there

come the tins of herring in tomato sauce, marinaded herring, spiced herring, filleted herring in olive oil, and smoked herring, which are about the size of French sardines, put up in olive oil.

It is said by one who has been long in the business of importing fish that 96 per cent of the herring imported from Norway and Holland is eaten pickled, and is not cooked.

Catching and marketing tuna fish. Another customer at the fish market bought an article which will take us on a long voyage from the sea where the fat Iceland herring is caught. She took a twenty-five cent can of tuna, or "chicken of the sea," as it is called. It is also known as "the aristocrat of the ocean." Tuna is found only in the mild waters of the Pacific, off the coast of southern California. The island city of Avalon, Catalina Island, California, is famed for its tuna fishing. The California leaping tuna is one of the gamest of fish. Like all other tuna fish, it is caught with hook and line and will battle for hours before it can be safely landed. The tunny fish, which is of the same family as the California tuna, is caught in the Mediterranean.

It is the long-fin tuna, however, that furnishes us with a rare delicacy. These fish travel in large schools, live in deep water, and come to the surface only in mild weather.

In the early summer, small power boats from California fish for tuna at from five to fifty miles out from shore. In this manner the larger California tuna canneries are supplied. Tuna fish weigh from fifteen to seventy-five pounds each and are very active.

The fish are cleaned on the boats and when they

are brought to the canneries are given a thorough washing with salt water. They are then cooked whole by steam in big steel retorts, or boilers. When the fish are thoroughly cooked, the skin, bones, and dark meat are easily separated from the white, which is packed in tins and again cooked. Some Italian and French tunny fish are packed in olive oil but this is sold mainly to native Italians in this country.

Sardines. By choosing a box of French sardines packed in olive oil, one customer at the fish market drew a contribution from the warm waters of the

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Sardine fisheries on the coast of Yezo, Japan. After the oil is pressed out the waste is sent to the other islands to be used as fertilizer

Mediterranean. On the same shelf were boxes of Norwegian sardines packed in tomato sauce. These are a little fish known as "brisling." American sardines packed in cottonseed oil and in mustard dressing were also on sale at the market. These are a much cheaper grade of sardine, produced for the trade that cannot afford the more expensive grades. The best sardines are those packed in olive oil and shipped from France. Portugal also sends us sardines in olive oil, but these are not as popular as those of the French pack.

The sardines caught by American fishermen in the Atlantic Ocean are found off the coast of Maine. In California, a large industry has been developed in the packing of sardines. They are packed in olive oil, in tomato and mustard sauce, and are also spiced. At first the packers called these fish mackerel, but the government found them to be really a genuine pilchard, which is the same as the sardine caught in Portuguese waters. Japan is pushing ahead in the sardine industry to a notable extent.

A Brittany catch. Now open your geography, and on your map of Europe find Brittany in France. From here come the world's finest sardines. If we were to journey to Brittany, we should find many large canneries, with many men, women, and children busily at work preparing the sardines for our tables.

The best fishing months in the Brittany waters are September and October. Large quantities of bait in the form of salted cod eggs and of other fish eggs mixed with flour, are thrown into the water about the nets in order to attract the sardines. The

The world's fishing grounds. Where the principal fish are caught, with chief lines of export

fishermen try to get their catch to the cannery as soon as possible so that the fish will be in fresh condition when delivered. Usually they are able to deliver them to the cannery within two or three hours after they are caught.

When the fish reach the cannery their heads and insides are removed, and the bodies thrown into large vats of strong brine where they are left for an hour. They are next put into baskets and washed in fresh or salt water to remove the loose scales, dirt, and undissolved salt. Then they are dried, in the open air if possible.

For open-air drying, the fish are arranged by hand, in wire baskets or trays, each holding about one hundred and fifty medium-sized fish, and set on wooden frames or racks. The fish are placed with their tails up, so that the water may run out. They are left to dry for about an hour and then taken, in the same baskets, to the cooking rooms. There they are immersed in boiling oil. They are allowed to cook in this oil for from two to four minutes, after which the oil is drained off and the fish are taken to the packing room. They are next packed in cans, the best sardines with the highest grade of olive oil, and then cooked again in boiling water.

Sardines are also packed in other ways, but this one method will enable us to form an idea as to how these fish are prepared for market.

Sardellen. The next customer at the fish market was an old gentleman, who looked as if he were either a foreigner or a man who had traveled widely. He asked for sardellen.

What are sardellen? They are a small fish of the

herring family. They are caught in the Zuider Zee, spiced, and put up in Holland. Sardellen are very expensive. They are sold in small hardwood, hand-made kegs for $1.25 a keg. The kegs hold from one and a half to two pounds. A peculiar thing about the sardellen is that the longer they remain in the kegs the more valuable they are. This is probably the only packed fish that becomes more valuable with time.

Sardellen are used by chefs for flavoring steaks. The Hollanders soak them in milk for about twenty minutes and then eat them uncooked in sandwiches.

All of this teaches us that the herring family supplies us with many delicacies, affords work for many thousands of men, women, and children, and in some countries practically replaces meat on the family table.

Mackerel from northern seas. Another customer at the market, a little girl, bought a pound of mackerel and again sent us back to the waters of the North. While our own fishermen catch great quantities of this fish off Nova Scotia, we buy many million pounds from other countries each year. In one year we imported more than 10,000,000 pounds of mackerel from Norway alone. We also import mackerel from England, Ireland, Canada, and the Netherlands.

The Norwegians catch their mackerel in the Skager-Rak. Note on your map how far this is from where the Americans fish for their mackerel. The mackerel is a great traveler. In 1884 and 1885 the United States produced 500,000 barrels of mackerel. Then the mackerel swam northward and disappeared from our waters. No one

knew where they went. The fishermen, thrown out of work, scattered and some of them went West. At that time the mackerel were brought into the market fresh instead of being salted on the boats, as they are now. By and by the mackerel returned from their long northern journey, to find no fishermen. But gradually mackerel fishing again became important.

The Norwegians claim to have the best mackerel because they cure them immediately, and they are whiter than the Scotch mackerel, which are allowed to remain unbled until they turn a darker color. But from Ireland we get a white mackerel as choice as the Norwegian. This is because the fishermen use small boats, allowing their nets to drag out behind them. At one end of the net is the boat and at the other end a buoy. The catches are made at night and the fish brought to shore early in the morning, when the women cut them up and pack them in salt.

The Norwegian fishermen travel with a school of mackerel and as fast as they catch the fish they bleed and cure them right in the boats. The men in the boats will have as many as half a dozen lines apiece trailing in the water.

There is a very fine small mackerel put up in tins by the French. It is a trifle larger than the ordinary sardine and is packed in olive oil. We also receive canned mackerel from Holland and Scotland.

American mackerel. The common mackerel, which is a very beautiful fish, appears in enormous schools swimming northward off the coasts of Virginia and Maryland. The fisherman takes his toll from these schools as they proceed toward colder

waters. They have been traced as far north as Labrador, where they have disappeared. How much farther north these fish go, no one knows.

The American mackerel is caught mostly in drift or train nets, but single nets are also often used. Fresh mackerel is in season only from April to November, but the greater part of the catch is salted, smoked, and canned. Mackerel is also pickled and spiced. In Europe the best mackerel is caught off the coasts of Norway and Ireland, and in this country off the coast of New England.

The Norwegian mackerel is caught with hook and line. The Scotch mackerel is caught with seines, that is, nets with buoys attached. At night the nets are set, the fish swim into them, and in the morning the hauls are made.

Sometimes mackerel attain a length of twenty inches, but the mackerel of average market size is about twelve inches, and the average weight from three quarters of a pound to a pound.

Codfish. Another patron of the market, a little girl with flaxen hair and big blue eyes, bought three pounds of lutefisk. Swedish lutefisk, vaakerfisk, zartfisk, winterfisk, and Italian roundfish are all made from stockfish, which is dry-cured codfish.

Codfish are caught off the banks of Newfoundland and Nova Scotia and in the Arctic waters along the far northern coasts of North America and Europe. Cod ranges in size up to one hundred pounds. A common length in codfish is two and a half to three feet. While the greater proportion of codfish is salt-pickle cured, yet there is a considerable amount of it used fresh. It is caught with both nets and lines. On account of its large size and the stormy waters

it inhabits, fishing for cod is a fascinating but a very dangerous occupation.

Codfish is cured as soon as possible after catching. The fish are first split from head to tail and then cleaned of all traces of blood by repeated washings in salt water. After the water is drained from them they are placed in vats and covered with salt, where

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Filling up the boning tables. Preparing codfish for the market

they are left until cured. When cured they are washed and brushed to remove the salt and then put in the sun to dry.

We import large quantities of codfish from Canada and the Scandinavian countries.

From the same waters as codfish come haddock, hake, and pollock.

The anchovy. One of the most interesting of all fish is the little anchovy, which, when put up in bottles, usually finds its way into wealthy homes.

The genuine anchovy is caught in the Mediterranean Sea and packed in France and Italy. It is a very small fish and is packed in olive oil and put up in cans and handsome ringed bottles. The Italians also pack anchovies in salt and put them up in large tins containing from one to twenty-five pounds. In France, anchovies stuffed with small red peppers are also put up in ringed bottles. The Germans import them to make anchovy paste, which is put up in tubes and shipped to all parts of the world. England also makes this paste and puts it in little stone jars. This anchovy paste is used chiefly for sandwiches. The ancient Greeks prepared a sauce from anchovies which was known as "garum."

The fish known as the Norwegian anchovy is entirely different from the Mediterranean anchovy. The Norwegian anchovy is not an imitation of the Mediterranean, for it has been in use in Norway for many years. The original Norwegian anchovies, sold in pails and small barrels, were spiced "brisling," the same product as that put up in Holland. Besides pickling and spicing them, the Norwegian canners now tin their product in olive oil, oyster, tomato, and wine sauce.

Caviar. Another product, which goes with the anchovy into the homes of the rich, is caviar, which is put up in small jars or tins. Genuine caviar is the salted roe, or eggs, of sturgeon caught in the Caspian Sea. Not many years ago this product was made from the sturgeon caught in our own inland lakes. As the supply of sturgeon has become exhausted, some American packers have resorted to obtaining roe from domestic fish caught in the rivers and inland lakes of the South, such as

spoonbills, buffalo fish, and catfish. But this roe is not large, nor has it the fine flavor of sturgeon roe.

The finest quality of caviar is that from the beluga, the "great white sturgeon" of the Russians, largest of all sturgeons. This fish attains a length of twelve or fourteen feet and weighs more than a

Preparing caviar. The sturgeon roe is rubbed lightly through a seive to remove the fine tissue enveloping the eggs. Then it is salted and put in tins or jars

ton. A single "cow" or female fish has been known to give three hundred and seventy pounds of roe. But these large fish are becoming extinct and the average beluga now caught is much smaller.

Practically all Russian caviar is handled by German merchants, who export it to all countries. In 1914 the supply was large and the Germans bought almost all of it, but throughout the European War its export was impossible.

Lobster. The last sale observed at the fish market was a pound can of lobster. By many people the lobster is considered the most delicious of all sea food. Enormous quantities of lobsters are consumed in the fresh state and when used in this way they are usually sold alive. Lobsters are caught in traps known as lobster pots, and are brought to market alive. They are found all along the Atlantic coast, from Delaware to Labrador, but the coasts of Maine and Nova Scotia furnish the largest yield. Lobsters sometimes attain a weight of twenty pounds.

Breeding the lobster. It is said that only about one lobster out of every 5,000 will reach maturity, but as the large lobsters lay as many as 40,000 eggs at a time, it is unlikely that the family will become extinct. Also the government has adopted "sea nurseries" where artificial propagation has proved successful. According to the statistics of the United States, the lobster industry of this country in one year amounted to almost $2,000,000. The volume varies from year to year.

A peculiar thing about a lobster is that it grows only during the period after it has cast its shell and while the new one is forming. But during this period its growth is marvelous. This is nature's way of offsetting the hard shell which envelops it, as that will not stretch and naturally the young lobster must do its growing while it can. So the lobster must make its growth while it is free from the shell or before the new shell is sufficiently hardened to prevent growth.

Lobsters are continually fighting each other. During their combats, it is quite common for one of the fighters to lose a leg or a claw. This will be

replaced by a new growth, which, however, will be smaller than the original.

In spite of the enormous quantities of lobsters caught at home, we buy yearly from other countries —chiefly Canada—about 6,000,000 pounds of fresh lobster. A very small amount comes from Europe and Asia.

For the benefit of the people in parts of the country where fresh lobster is not available, and for the convenience of those not wishing to cook the lobster themselves, many thousand cans of this delicacy are put up in this country every year. A limited amount is also imported from Europe and British South Africa, while large quantities are imported from Canada. In one year, for instance, Canada, besides its usual shipment of fresh lobster, furnished us with almost 3,000,000 pounds of the canned article.

Crab meat from Japan. One cannot consider the lobster without mentioning its first cousin, the crab. Crab meat, especially that of the Japanese crab, is very much like lobster. When the first Japanese crab meat appeared on the American market a few years ago, it was hailed with delight. We now receive many thousands of pounds from the Japanese each year. This is packed in one-pound tins. Crab meat may be served in a variety of ways.

The terrapin. You have already learned so much about ocean delicacies that you probably will not be surprised to learn that perhaps the most expensive meat eaten to-day—that of the terrapin—comes from the sea. But it will no doubt surprise you to learn that this meat was once considered practically worthless and was therefore fed to slaves and the

lowest grade of laborers. The terrapin belongs to the turtle family. It is a small turtle, ranging from three to nine inches in length, and yet a single one sometimes sells for eight dollars, although the usual price is considerably less. A peculiar thing about the terrapin is that only the female is considered good to eat, the male being practically without value.

Chapter XVII

THE HANDLING OF FRESH FISH

Summer-caught fish. Fish caught in our rivers, lakes, and seas that are to be sold fresh, or uncured or canned, are divided into two classes: summer caught and winter caught. Summer-caught fish are sometimes frozen before shipping, though the general practice is to put them promptly into boxes filled with cracked ice for shipment to the various markets throughout the country. They are carried in special fish cars designed to keep the ice in the boxes from melting. These cars, which are known as fish refrigerators, also are iced, especially if they are to travel a considerable distance.

When ice-packed fish are received at the markets they are distributed to the various retail stores for sale to the public. Sometimes more ice-packed fish are received than can be sold immediately, and the surplus is sent to the cold storage plants to be frozen. In this condition the fish can be kept indefinitely.

When the surplus stock of ice-packed fish is received at the cold storage plant, the fish are dipped into water and passed into a "sharp freezer," with a temperature of about ten degrees below zero. There the fish are allowed to remain until frozen stiff. Then they are removed to the storage rooms, which are also kept at a temperature below freezing.

The small fish are placed in pans and frozen in quantities, whereas the larger fish, such as the halibut, are frozen singly. After being frozen, the fish are "glazed" by being dipped into water. The

intense cold of the frozen fish causes a thin ice to form over them immediately, thus doubly insuring their preservation. The best known of the summer-caught fish are the salmon, halibut, pickerel, trout, whitefish, cisco, bass, and mackerel.

Winter-caught fish. Then there are the winter-caught fish, which are frozen at the time of catching. In the Northern States, especially in North Dakota and Minnesota, the problem of handling and storing fresh fish is simplified by the assistance of Jack Frost. During the winter months peddlers cover the countryside selling frozen fish from their wagons. These peddlers often dispose of hundreds of pounds of pike, pickerel, perch, and bass a week, the

Glazing small frozen fish in tanks in the freezing room of a wholesale fish market. The thin ice which forms on the fish when dipped in water makes their preservation still surer

customers buying large supplies at a time, because the fish can be kept until the cold weather breaks.

It is not unusual, for instance, for a small country hotel to order from three hundred to five hundred

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At a summer-caught fishing plant. Trout taken from the waters of the Great Lakes are being dressed for market

pounds of fish. In a certain North Dakota town one peddler thus handled four cars of frozen fish in a single season. His supply was kept in an old woodshed and peddled throughout the country.

While winter-caught fish are secured in practically all the lakes throughout northern Minnesota, yet a great percentage of them come from the Canadian Great Lakes: Manitoba, Winnipeg, and Winnipegosis. The fish consigned to the towns in North Dakota and Minnesota are transported in ordinary freight cars, but for shipping great quantities of frozen fish throughout the United States, the special fish refrigerator cars are used. In this

way, frozen fish may safely be shipped even to the warmest states of the South and arrive in perfect condition. When the fish reach their destination, they are, of course, immediately sold or placed in cold storage.

Let us imagine for an instant that we are up north among the Great Lakes of Canada, out on the ice with the fishermen. We would be sheltered from the driving wind by small tents and snow walls or even snow houses, toiling side by side with the French Canadians and the husky Swedes. We

Frozen fish in a cold storage plant. Large fish not to be sold at once are frozen singly and in this way may be kept indefinitely

would do our fishing almost entirely with nets, though great quantities of fish are caught with hook and line, and many are speared.

Although it would be bitterly cold out on the ice,

yet we would get enough exercise to keep us from becoming numb. For it would take all our energies to handle the nets, keep the ice from forming over the airhole through which we would fish, prevent the fish from becoming imbedded in the ice while freezing, and pack in boxes the fish already frozen.

The local dealers would haul away great wagon-loads of unpacked fish, but the frozen fish would be shipped in large boxes to the various large cities in the United States.

Then we would see these boxes loaded into large sleds and hauled to the nearest railway station, where they would be placed in refrigerator cars. If bound for the warm Southland, these cars would be iced at a northern shipping point, and their iceboxes kept filled with ice and salt until they arrived at their destination, with the fish frozen as stiff as when placed in the car.

A snowfall makes it much easier to handle the fish, as they are allowed to freeze in the fresh, crisp snow, which need not be removed in packing.

Marketing salt water fish. The principal salt-water fish marketed fresh are the halibut, the salmon, and the herring. A hundred-and-fifty-pound halibut, for instance, is caught in Alaskan waters, hurried to a local packing station, boxed in ice, and carried in a fast steamship to Seattle. There it is re-iced, transferred to a fish refrigerator car, and shipped east.

If consigned to Chicago, this fish could be on sale at a retail market in that city within a week after it was caught, or could reach the market in any eastern city twenty-four hours later.

Chapter XVIII

THE STORY OF THE SALMON

A common all-round food. No doubt canned salmon seems to the average American boy or girl one of the most common and uninteresting articles of food that could be mentioned. Its use is almost universal. No grocery is so small, so poorly stocked that it does not carry at least a small supply of canned salmon. If you could search the shelves of any cabin far away from a railroad or a store, you would be almost sure to find there a few cans of this fish laid by for an emergency. And what camping outfit would be complete without its supply of canned salmon?

Yes, salmon is certainly common in the sense that it is to be found almost everywhere. But in many ways it is probably the most interesting and the most useful fish the sea furnishes to man. You have eaten it scores of times without giving a thought to its real value to the world or to its thrilling life story.

Now suppose salmon were suddenly cut off from the world's food supply; the result would be a calamity felt in almost every home. Literally millions of people are fed by the salmon fisheries. Neither the rich nor the poor have much to eat that is more wholesome than this familiar food — a food which comes to us not in its original form but cut into pieces and packed in a tin can. This fish in its natural state is entirely unfamiliar to most of those who eat it. Of the millions of boy and girls who have become acquainted with salmon at their

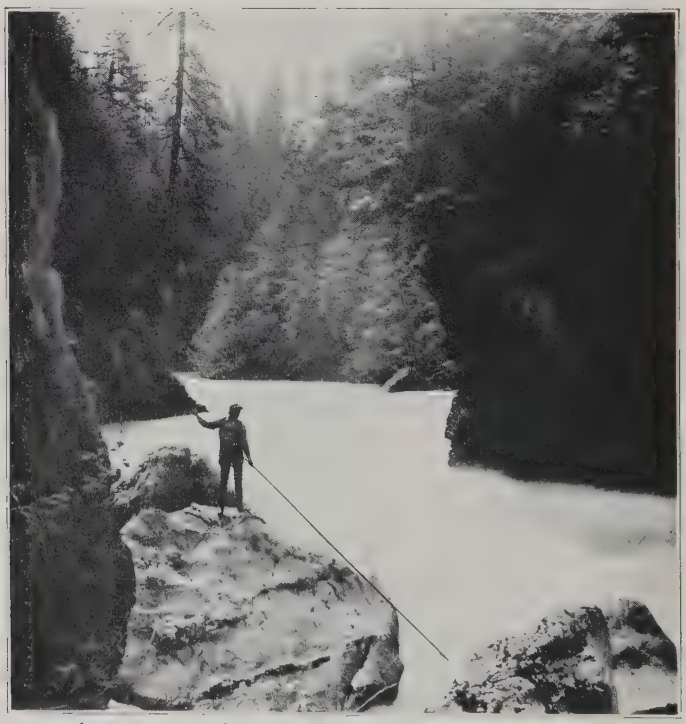
own tables only a few thousand have any idea of how the fish really looks.

The next time you taste this dainty pink morsel you will no doubt have a keener appreciation of this well-known food. For you will have learned something of the life history and habits of this wonderful fish — something of his wanderings, his struggles, and his final dramatic journey taken in response to a compelling law of nature. The story will seem all the more vivid if we give him a name and think of him as an individual and not merely as one of a million almost exactly alike.

Chinook, a salmon king. Chinook was a salmon king — a big, handsome, bright-eyed, elastic fellow, weighing about sixty pounds. He was king of the Oncorhynchus tribe and larger than any of his fellows — the Sockeye, the Humpback, the Coho, or the Chum or Dog Salmon. His tribe lives in the Pacific Ocean, Puget Sound, and the rivers of Oregon, Washington, British Columbia, and Alaska. He has a cousin in another tribe, the Salmo family. His cousin's common name is Steelhead and he is also known as the Salmon Trout. Steelhead is now found in other waters, having been transplanted from his native Pacific to the Great Lakes and northern rivers of America and the rivers of Europe. He is caught by fishermen with hook and line.

Chinook was born far up a big river where the water sparkled and flashed in the sunlight and rushed madly over cool stones. When he was four months old he started to swim down the river to the ocean. He belonged to a numerous family — four thousand brothers and sisters. But now only about half of them were left and his parents had both perished.

The Chinook family had many enemies who destroyed the defenseless young salmon. Chinook had



A scene on the Columbia River, one of the greatest salmon streams in the world

had many narrow escapes and as he saw his brothers and sisters snatched away by the score, each day he grew more wary, more resourceful.

When at last the family reached the salt water of the ocean, it had dwindled to less than five hundred. But now the young salmon were active swimmers and better able to care for themselves.

For three years Chinook enjoyed a wild, free, dashing life. But in the fourth year nature called him to the spawning grounds and with multitudes of his kind he set out on his great adventure. In obedience to nature's law, he sought the river of his birth. When that was found he swam swiftly upstream, heeding nothing and driven by a force that allowed no pause. Neither he nor his companions stopped to eat, but pushed steadily forward. As the river narrowed and became more rapid the journey grew more perilous. There were many swift currents to fight, many jagged rocks to avoid, many riffles to ascend, and many little falls to leap. Nothing but death could stop them. At last they came to a high fall over which the water leaped, roaring wildly.

Once, twice, three times Chinook tried to leap it, but each time he failed. Again and again he made a brave dash until at last, thrown back bruised and exhausted, he was too weak to try again. Just then he made a discovery. Up one side of the big dam which blocked the way he saw a "fish ladder." The ladder had been placed there so that the fish returning to their spawning waters might not kill themselves trying to leap the dam. Up this ladder flashed the fish, speeding toward the little fresh-water lake that nestled in the tree-covered hills before them.

On their way up, King Chinook and his brothers had met thousands of other pilgrims who were also returning to their native waters in large schools. Many of these fish were now swimming quietly in the clear, cold snow water of the lake.

Finally Chinook chose a mate. But to keep her he must first fight many a fierce and bloody battle

with other valiant warriors. When at last Chinook and his mate reached the spawning grounds they

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A "fish ladder" on a salmon stream in Oregon. By such ladders, salmon on their way up the river are helped over falls and dams

were both weak from the long journey and from fasting, for they had eaten nothing since they left the ocean. While his mate rested, Chinook dug a hollow or nest in the gravel with his snout and tail, adding many more wounds to those already received in battle. His mate placed her eggs or spawn — three or four thousand of them — in the nest. Now their task was done, for the cool running water would hatch the eggs without further aid from them. Then

side by side they drifted tail foremost down the river until death claimed them.

Yearly millions of salmon return and take part in a tragedy similar to that of Chinook and his mate, for all the salmon of the Oncorhynchus tribe die soon after spawning.

Hatcheries increase salmon supply. When the salmon had only the Indians and their natural enemies to contend with, nature was easily able to maintain the supply. But the white man came, dammed the rivers, built irrigation ditches, and began to fish in ways that threatened the extinction of the fish. Therefore the United States government found it necessary to help the fish by putting up hatcheries where millions of young are hatched and protected until they are given a good start in life. Many salmon hatcheries have been built by the federal government in Alaska, California, Oregon, and Washington. The state governments on the Pacific coast are also maintaining hatcheries. These hatcheries have not only prevented the serious falling off in the number of salmon but have actually increased the supply. In Washington alone, there are twenty-two salmon hatcheries from which more than 100,000,000 young salmon are turned out every year.

It requires fresh running water of an even temperature to hatch the eggs. So the hatcheries are usually built near the spawning grounds, and are so constructed and located that running water constantly flows through them.

About four months after the eggs are taken to the hatcheries, the young salmon are nearly three quarters of an inch long. They are then known as

"fry" and are considered ready to be let loose. After they are turned out into the streams they soon

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A fleet of salmon trollers off the coast of British Columbia. A troller's catch of salmon often amounts to six or seven hundred fish in a day

make their way to the ocean. Often, however, they are kept in nursery ponds where they are fed until they are much stronger and better able to protect themselves from their natural enemies in the streams.

The little salmon seek the ocean and experience the same dangers as did Chinook. In their fourth year, they make the same exciting pilgrimage up the stream of their birth, and on the way they are either captured for a cannery or finally reach the spawning grounds to breed and die.

Trolling for salmon. We now come to the task of catching these fish. We shall find the camps of the fishermen known as trollers near the Salmon Banks, so called because that is where the salmon feed. Many fishermen live on their boats during the fishing season. Should we go with a troller we

should see that he has several poles sticking out from his boat. To each pole are attached two or more lines provided with spoon hooks. Hooks baited with small fish are also used. The troller's catch often amounts to six or seven hundred fish in a day. But his life is not all sunshine, for in stormy weather his position is perilous. At times, too, he is unable to locate a school of fish and, after days of fruitless toil, is obliged to return to the shore stations empty handed.

Fishing for salmon with gill nets. The fishermen stretch their great nets squarely across the channel or river mouth on the incoming tide. Then as they

Gill netters and purse seiners in harbor. The purse seiners, in their swift motor boats, chase a whole school of salmon, encircling the fish with a huge net

rush swiftly forward the oncoming salmon poke their heads in the meshes and are caught by the gills.

Taking salmon with a purse seine. Quite the most exciting and one of the best ways of catching salmon is with a purse seine. This really means chasing a whole school of salmon in powerful motor boats and encircling the fish with a huge net. This net is often five hundred yards long and seventy feet deep. It is closed by pulling the "purse line" at the bottom in the same way as an old-fashioned purse is closed by pulling the "puckering strings" at the top. This great net is kept in a vertical position by means of cork floats at the top and weights and iron rings at the bottom. The "purse line" runs through the iron rings at the bottom and the net is drawn tight after the fish have been encircled. Sometimes a single haul will take as many as 3,000 fish.

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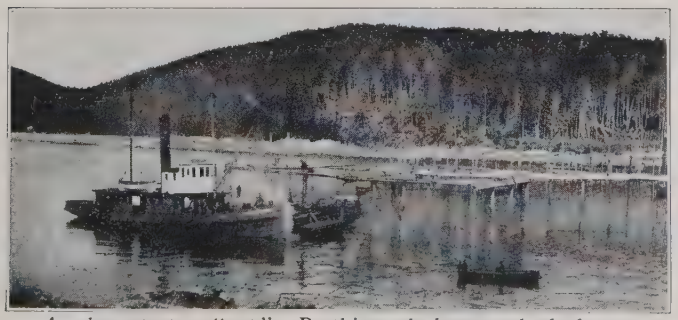
Fish wheel on the Columbia River, Oregon

The Columbia River "fish wheel." On the Columbia River another very curious and interesting device, the "fish wheel," is used for catching salmon. It usually consists of a shallow boat, at one end of which is a wheel about twelve feet high. This wheel, which really resembles nothing so much as a garden hose reel, is fitted with a belt of fish net. The fish are caught in this net and as the wheel revolves are brought to the surface and dumped into the boat. Stationary or fixed fish wheels are also operated

at certain points along the shore. These stationary fish wheels are larger than the floating ones.

Trap or "pot" fishing. The largest catches, however, are made with traps or "pots." The salmon trap is composed of wire netting or tarred webbing stretched on piles or posts leading from a point where the fish are expected to come on their way to the spawning grounds out to the "pot." This "pot" is entirely inclosed with netting except at the mouth, or opening, by which the fish enter. The general plan of the trap is like that of the "deer drive" made in early days by pioneers on the western frontier — a device about which nearly every boy has read something.

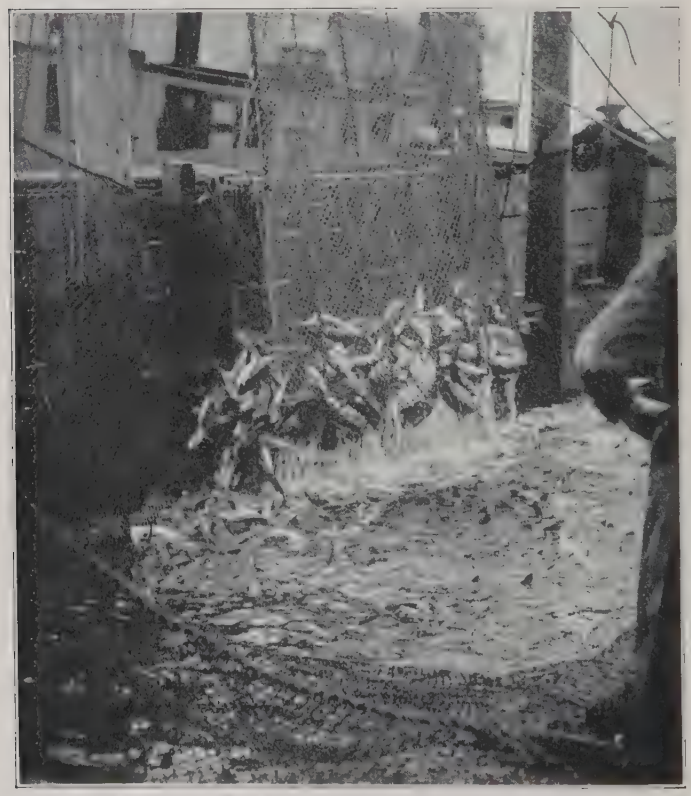
The trap is so made that the fish are steered into the "pot" by the wings of the "leads" or webbing. When once the salmon enter the trap they seldom if ever escape. When it is time to collect the fish, the cannery "tender" or tug brings a fish scow, which has been scrubbed clean with salt water, and



A salmon trap or "pot." By this method are made the largest catches from fish on their way to the spawning grounds

places it alongside the "pot." An immense "brail" or dip net operated by a power winch, or windlass,

is carried by the tender and with this the fish are dipped from the "pot" and dumped into the scow. This barge or scow is usually made to hold at least 15,000 fish. As fast as one trap is emptied the barge is moved on to the next and the process



Brailing salmon. The fish are scooped out of the "pot" with an immense brail or dip net and dumped into a scow

repeated. In trap fishing it is not unusual for as many as 10,000 fish to be taken from one "pot" in a

single day. Of all devices for catching salmon the trap is undoubtedly the surest and secures the greatest harvest.

Canning the salmon. After the salmon are caught they are carried as quickly as possible to the canneries that are always built at the water's edge. The fish are at once transferred to the butchering room. Here, by the old-fashioned method, a gang of twenty to forty Chinamen or other Orientals — the number varying according to the size of the cannery — open and clean each fish and cut off its fins and head. Then the salmon are dropped into a trough of running water to be scoured by other Chinamen. This old-fashioned method is now seldom used except by the smaller canneries unable to afford modern machinery. In all of the larger canneries, the Chinese butcher has been crowded out by a machine known as the "Iron Chink." This machine is able to do the work at the rate of fifty fish a minute.

After the fish have been scoured a second time they pass under circular gang knives and are cut into pieces suitable for canning.

In most factories the salmon meat is packed into the cans by machinery. In a few, however, this work is done by young women. Each can contains one pound of fresh salmon and a quarter of an ounce of refined salt. If smaller cans are used, salt in the same proportion is added. Nothing goes into the can besides the salmon and the salt. The cans of salmon are weighed and sealed by automatic machines. They are then covered with hot water as a test for leaks. If a can sends up a bubble it is instantly removed and resoldered while still hot.

In what is called "old-style processing," the cans are next placed in retorts and cooked in live steam for about forty-five minutes at a temperature of 220° under a pressure of about twelve pounds. Then a small hole is made in the top of each can to allow any surplus steam, gas, or water to escape.

A load of ten thousand salmon. The result of a single day's trap fishing

This hole is closed with solder while the can is still hot. The cans are returned to the cooking retorts

and given a second cooking for one hour, at a temperature of 240°. They are then cooled and tested,

Feeding salmon to the "Iron Chink." This machine, which has largely displaced the Chinaman in the canneries, can cut and clean fifty fish in a minute

after which they are dipped in lacquer and labeled.

The solderless or "sanitary" can is fast pushing this old-style can out of use and therefore in many cans you will not find this second soldered vent hole. Under the new method the surplus fluids and gases are allowed to escape in the heating process before the top is sealed tight. The cooking in the retorts then lasts for ninety minutes at a temperature of 240°. This softens the bones and completes the sterilization of the fish so that with anything like proper care it will "keep" almost indefinitely. Put up in this way salmon fully meets the high standard for wholesomeness set by the national pure food

laws. Inspectors in the employ of the federal government examine the output of every salmon cannery.

Packing salmon in tins. In most of the larger factories this slow method of packing the fish by hand has been replaced by modern machinery

Other ways of preserving salmon. Not only are canned salmon shipped from the Pacific coast, but

fresh salmon as well are distributed throughout the whole country. Salmon are also frozen, smoked, pickled, and mild-cured. In the mild-cured process the fish are put in a weak brine and packed in tierces or casks containing about 800 pounds each. The mild-cured are the Chinooks and the Cohoes or silver salmon. Some of the mild-cured fish are sent to Europe and there smoked. Some are also smoked in Chicago, and other cities in this country. Many American boys and girls work in the large canneries on the Pacific coast and thus help in the support of their families.

Supply and distribution. The chief sources of our salmon supply, in the order of their output, are: Alaska, Puget Sound, British Columbia, the Columbia River, and northern California rivers. About half the salmon pack is consumed in the United States and more than three fourths of the remainder in the United Kingdom, Australia, South America, and the Philippine Islands.

In one year $14,500,000 worth of salmon was canned in Alaska; $18,600,000 worth in the Pacific coast states; $9,000,000 worth in British Columbia; making a grand total of $42,100,000 worth of salmon canned on the west coast of North America that year. This supply would allow about four pounds of salmon to each man, woman, and child in the United States. If the cans were placed end to end they would make a belt that would encircle the earth, with enough to spare to stretch from New York to San Francisco. Every year the salmon industry uses 100,000,000 fish, each weighing from three to twenty-five pounds or more, some of them measuring nearly five feet in length.

Within the last few years, several salmon canneries have been built on the Pacific coast of Siberia, but as yet the quantity of salmon packed there has not been great. The principal species of salmon packed in that country are the Humpback and the Chum.

Canned salmon is recognized as an excellent food for soldiers, and during the Russo-Japanese War immense quantities of Chum salmon were bought by the Japanese government for the use of its fighting men. In the early part of the great European conflict, Canada furnished 25,000 cases of tinned pink salmon to the British army. The diet of the United States army and navy includes a liberal allowance of canned salmon.

Chapter XIX

OYSTERS

The oyster a general favorite. One of the oldest foods known to the human race is the oyster. History has it that primitive man to a great extent depended upon the oyster and other shellfish for his food.

While Canada, Holland, Italy, England, Belgium, Japan, Germany, Spain, Portugal, Denmark, Norway, and Russia have all at some time or another counted oyster fishing among their industries, France and the United States are the only countries where it has reached large proportions. Of these two countries, our own maintains by far the more extensive oyster beds.

We are all fond of this wholesome food, which neither abundance nor cheapness can make common. Whether placed before us stewed, fried, steamed, or raw on the half shell, there are few of us that can withstand the appeal this shellfish makes to our palates. And in Europe, the land of delicacies and of epicures, we find the oyster almost supreme. The Parisian queen of fashion gives the oyster first place on her elaborate menu; the English hostess at the country place features this fruit of the sea at her week-end dinners; and the frugal wife of the Dutch peasant gives it the place of honor at her simple table.

The American oyster abroad. We export many thousand gallons of shelled or "shucked" oysters and many thousand bushels of unshelled oysters

each year to Europe and to other parts of the world. One may purchase Chesapeake Bay oysters in

Courtesy of U. S. Bureau of Fisheries

An oyster fleet off the coast of Chesapeake Bay

Russia, France, South Africa, Japan, Australia, or any other country where there is wealth enough to allow men and women to satisfy their taste for foods brought from a long distance.

It is usually conceded throughout the world that the oysters of American waters are the finest grown anywhere. In many parts of Europe the most discriminating diners request that they be served American oysters and will accept as substitutes for these only the small, delicate product from the Dutch waters.

Nationalizing the oyster. Few changes that have affected our national food supply in recent years are more important or wonderful than the nationalization of the oyster. There are men who can recall the time when fresh oysters were a rare delicacy to the inhabitants of this country, except along the

seashore. To-day they are obtainable any time in the season almost anywhere in the United States, and at a price that puts them within reach of persons of the most moderate means. This has been made possible through the great progress made in the methods of handling and shipping oysters so that they may be carried far inland without spoiling.

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Acres of oyster beds at Cancale on the coast of Normandy, France

"Cove oysters." Before a system had been developed for the safe transportation of fresh oysters

to remote parts of the country, a method was devised of steaming the bivalves and packing them in hermetically sealed, or airtight, cans. These are known as "cove oysters," and are popular even where fresh oysters can be had.

Oysters for inland markets. Because of the wonderful improvements in handling and forwarding this most delicate and perishable of foods to points far in the interior of this great country, our nation has, within late years, built up a mighty trade in oysters. To-day there is hardly a hamlet so remote from the seashore or from the centers of civilization that its inhabitants do not celebrate the coming of September with an oyster supper. These fêtes continue until the letter "r" disappears from the name of the current month.

The rancher, the lumberman, the miner, and all who work in the more isolated inland localities are almost sure to celebrate their appearance in town with a feast of oysters. At the same time the rulers of the earth, and those who live in the capitals of fashion and are free to indulge their taste without thinking of expense. can order nothing more tempting.

We have much reason to feel grateful that this country has a vast natural supply of oysters—by far the richest of any country in the world—and that the development of rapid transportation, of refrigerator cars, and refrigerated shipping containers has made it possible to place the oyster—in season—on the tables of families in almost any part of the United States.

Oyster culture in America. At one time it seemed that our great natural supply of oysters was doomed

to destruction through the greed of the men who were permitted to take this rich harvest from the sea.

Courtesy of U. S. Bureau of Fisheries

An oyster stockade. Breeding oysters are planted upon piles of rocks beneath the water. These rock piles are surrounded by stakes to which the young oysters fasten themselves

So rapidly were our native oyster beds being destroyed, and with such vicious disregard of all laws and the common good, that public opinion finally brought pressure to bear on lawmakers to stop this wanton waste.

It was then that the ancient and neglected practice of oyster culture was suggested, together with adequate laws to govern the gathering of oysters. The pioneers in this good work recalled that the collection of oyster "spat," or young oysters, upon artificial stools was practiced by the Romans in the seventh century and that the same method is now employed in Lake Fusaro, Italy. This method is to pile rocks on the bottom of the lake and drive

stakes around them. Breeding oysters are planted on the rocks and their young fasten themselves to the piles or stakes, where they are left until ready for market.

A study of oyster culture in France, where it has been practiced since about 1865, as well as in Germany and other European countries, brought about a change of attitude on the part of lawmakers toward the reckless combing or raking of American oyster beds. The oyster beds in certain localities are now closed for long periods and no one is allowed to fish in them. Both our federal and state governments have passed laws governing the seasons of fishing, the locations, and the manner in which the oysters may be caught. European experiments had proved that oysters could be farmed successfully and both the quantity and the quality of the product improved by proper cultivation. Accordingly, oyster farms were platted, seeded with baby oysters, and cultivated.

Oyster farms. To-day a man may rent, lease, or buy an oyster farm from the state much the same as he would a dry land farm. The boundaries are plain and definite, even though the crop lies from twenty to a hundred feet below the surface of the water on which the fisherman's boat rides. In Rhode Island, for instance, the shellfish lands are leased to planters at so much an acre. The income from the oyster beds is used by the state to improve the industry.

There is virtually no limit to the amount of oyster land that one may lease for the growing of oysters. There is one man who is at present holding about twenty-five thousand acres of oyster land and paying

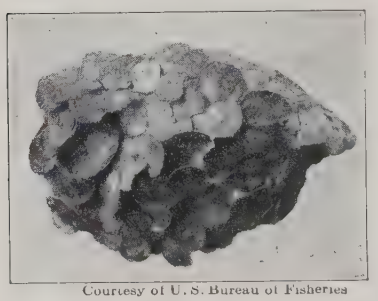
the state a good rental for the tract. In leasing such a large plot of land, this oyster grower took

Courtesy of U. S. Bureau of Fisheries

Oyster culture. How a planted oyster bed looks

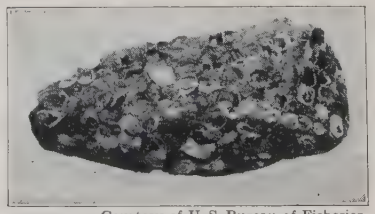
into consideration several important possibilities. The same beds may not be productive two years in succession; changes in the currents of the fishing waters may bury a bed under drifting sand and smother the crop of oysters. He also realized that to obtain the best results from oysters they must be transplanted and that he must have beds in different bottoms and at different depths. He recognized that emergencies might make it necessary for him to move his oysters or else have them destroyed, and he must, therefore, have several beds ready in order to meet this situation.

Growing the oyster. The oyster bed is prepared by clearing the ground of rubbish and then sowing "cultch"— shells and stones — upon which are "spats" of oysters no bigger than a pinhead. The best cultch is good fresh oyster shells, which sell for about five cents a bushel in the Chesapeake region, where our most famous oyster grounds are located. We can liken a "spat" of oysters to a "fry" of fish. Perhaps there may be as many as fifty of these tiny oysters upon one shell or rock. As they grow, the weaker ones are forced off. This process continues until there are left, say, two oysters. If they are both strong and hardy and firmly attached to the cultch one may grow around the other and in that manner make an irregular shell. Frequently more "spat" gathers upon these shells, causing the oysters to grow in "clusters" one on top of the other, until those inside the cluster are dead. But careful planters prevent this unnatural growth.



Courtesy of U. S. Bureau of Fisheries

Young oysters attached to an old shell—the ideal "cultch"



Courtesy of U. S. Bureau of Fisheries

Oyster spat on a stone

The beds are constantly examined and when it is found that the oysters are growing in clusters, the planter dredges or tongs them up, breaks them

apart, and replants them. In fact, the separating and placing in other beds begins as soon as the oysters are old enough to be transplanted. Their age is determined by the ridges that appear in their shells, which designate the growth made each year.

Forcing oysters for market. On the most favorable part of his farm, the oyster grower makes a forcing bed. He watches the oyster market constantly and studies the conditions of his crop. When he decides upon the quantity of oysters he wishes to market and the time when he wishes to reach the market with them, he selects the oysters he intends to force and plants them in the forcing bed. This is usually done during spring and early summer. Young oysters are not raised on these forcing beds. These beds are used solely for preparing for market oysters that are almost mature. The oysters are usually allowed to reach their third year before being marketed.

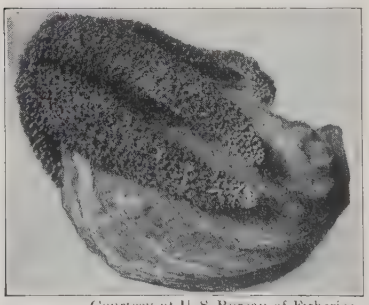
Copyright, 1917, by Keystone View Co.

A mountain of oysters ready for planting

Enemies of the oyster. But the planting, the transplanting, and forcing of his oysters do not constitute the farmer's only care. The closest attention is needed to protect his crop from the many enemies that prey upon it. Among these enemies are the starfish, the drumfish, the drill or borer, and many fishes which attack the oysters when

they are very young, before their shells have formed.

Suppose an army of starfish, or "five-fingers" as they are known to the oyster industry, should descend upon a bed. How would they attack the oysters and what would be the defense? The starfish closes its five fingers about its victim and then settles down to force open the shell—a task at which it is an adept. This done, the starfish almost literally inhales the oyster—absorbing it by suction.



Courtesy of U. S. Bureau of Fisheries

Most numerous among the enemies of the oyster are the starfish

At first the oyster planter knew of no way to cope with the starfish other than to pick his oysters bodily out of the bed and carry them away. This of course was not practical. But now there is a standard method which progressive oyster farmers employ. Great balls or tangles of cotton waste, rope yarn, or other soft material are the weapons used in the fight against these starry plunderers. The oyster growers drag these balls of cotton waste across the oyster beds. The starfish is covered with sharp spines which are easily entangled in these drags. As a result, thousands of the invaders are caught and hauled out of the water. They are then destroyed by throwing them into scalding water, which kills them.

The borers, although not so numerous as the starfish, are more dangerous because there is practically no way known by which a bed may be freed of them.

They fasten themselves to the shell of the oyster and bore a hole through which they put their sucking tube to draw out the oyster.

The drumfish do the most harm of all when a school of them descends upon a bed. Like other fish, they migrate and are therefore not confined to any certain spot. But, fortunately, they are not numerous in our oyster waters and they herald their approach by a heavy booming. This fish has grinders, that is, teeth set back from its jaws in rows like cobblestone paving, with which it crushes and grinds the oyster, shell and all. A school of drumfish may completely destroy a bed of oysters in a few minutes.

When the oysters are very young they are the prey of every fish in the waters, some of which might swallow enough tiny shell-less oysters at one mouthful to stock a bed for a season. It is said that only one oyster out of about every 10,000,000 reaches maturity. Nature, however, tips the balance in favor of the oyster, as the mother oyster sometimes lays as many as 60,000,000 eggs in a spawning season. If care is used in the cultivation of an oyster bed, it is possible to bring to maturity a much larger percentage than one in 10,000,000.

American oyster beds. While oysters are found along practically the entire Atlantic coast, the greatest yields are secured from Long Island Sound and Chesapeake Bay. The public oyster beds of the Chesapeake have yielded in one year nearly 15,000,000 bushels of oysters.

California also produces oysters which are much like those found in the Mediterranean and other European waters. The oysters of our North Pacific

coast are of fine grade, being highly prized by epicures. The oysters of Louisiana are also famous.

Courtesy of U S Bureau of Fisheries

An oyster stockade in San Francisco Bay. Here may be seen the young oysters fastened to the stakes

Although the natural beds were fished practically barren during the years previous to the passing of laws by the government to regulate the industry, the careful cultivation and the scientific development of oyster beds have actually increased the annual crop. In recent years the harvest of oysters has greatly increased and there is every reason to expect that it will continue to increase.

Each year more oyster land is being cultivated in this country and the oyster growers are learning more about their industry by a careful study of the various methods of oyster farming practiced in Holland, France, England, and Japan.

In spite of the enormous yield of oysters taken from our waters every year, we import this food from other countries in small quantities. The

French oysters, for instance, are demanded for consumption in a very few fashionable hotels in large cities.

Tonging and dredging for oysters. In "tonging" for oysters the oyster men usually work two in a boat, standing one at each end. They scrape the oyster bed with long tongs that look much like double rakes. These men become expert in this work and can tell by the touch when they strike a cultch, even though the tongs may have handles twenty feet long. Dredging for oysters is done with steam dredges which scrape the cultch from the oyster beds and dump it into scows that always accompany the dredge.

In Japan oysters are planted in beds which are left uncovered when the tide is out. This makes

Courtesy of U. S. Bureau of Fisheries

Tonging for oysters in San Francisco Bay, California. The fishermen become very expert in finding the oysters with these awkward, long-handled tongs

them easy to gather. It is excellent for the oysters, too, as they are said to grow much faster under

conditions of alternate exposure to air and submersion in the water. But this practice cannot be followed in the United States as the frost would kill the oysters. In Japan oysters are also planted on fences in the tidewater, which helps to make the harvesting of them very easy.

Shipping oysters. The oyster shipping season is from September until May, although for local use oysters may be harvested all the year round. In summer, the oysters, which are spawning, are not in good condition to ship. In some parts of the Atlantic, however, where the water is cold, the oysters are planted in early spring for summer use, as they cannot spawn in cold water.

After the oysters are gathered they are carried to the packing houses. There they are "shucked" or shelled, cleaned, and put into sanitary containers for immediate shipment to the markets. Oysters are shipped in refrigerator cars especially designed for that purpose.

Chapter XX

CANNED FOODS

The ever-present tin can. Altogether the most wonderful and important development in providing the world with food is typified by the tin can that is found wherever man sets his foot—whether in the heart of the great city or on the ice plains of the polar regions. This can of "tinned food"—to use the English term—is so widely used that it is one of the most commonplace objects that can be mentioned. It is so common, in fact, that the sight of a shelf full of these goods in a grocery, a kitchen, or a pantry hardly stirs a thought in the mind of the average boy or girl. The existence of this form of food is accepted as being quite as much a matter of course as beans, peas, or tomatoes growing in a garden. In fact, there are many thousands of boys and girls in the great cities who have never seen these vegetables growing. Unless they were told to the contrary, it would be natural for such children to think that tin cans were really the source of many fruits and vegetables. For, so far as their own vision is concerned, these children are able to trace these foods no nearer their source than the can. This odd viewpoint of the child of the crowded city districts is important and interesting here, because it brings out vividly the fact that canned foods are now so universal in their distribution that they are common in places where the same foods in a natural or uncanned state are either rare or unknown.

Beginning of the canning industry. Robinson Crusoe dried raisins in the summer for the very

Harvesting a bountiful crop of peas for the cannery. The first step in their journey to the consumer's table

reason that our American canners to-day put up hundreds of millions of cans of every kind of good things to eat. The canners have furnished the means for making bountiful harvests last over through seasons of scarcity. This they do in a way that brings vegetables, fruits, fish, meats, milk, and many other foods to our tables in a condition that is as pure, as sweet, as wholesome and appetizing as when the food that now comes from cans grew, swam, or walked on four feet. The canning industry to-day is one of the greatest achievements of civilized man.

From 1795 to 1804 François Appert, a Frenchman,

labored to preserve food in all its original goodness without the use of any preserving substance. And finally he succeeded. Appert found that foods spoiled because certain little organisms, called germs, grew in them when they were exposed to air and caused them to decay. If he could kill these organisms and keep new ones from the food—why, what was there to prevent its keeping sweet and good?

This is what he did: He placed different kinds of food in glass jars and bottles, which he tightly sealed and corked. Then he placed these containers in water and heated that water for different lengths of time. Later he removed his jars and bottles, cooled them, and after a long time opened them and tasted the food. Presto! It was sweet and good and tempting.

Appert's methods still followed. Roughly speaking, all there is to canning is simply putting the food in containers—we nearly always use tin now—sealing these, and heating them to a temperature that kills every little organism that would make the food sour or decay. Foods canned in glass containers are usually cooked before being placed in the jars or bottles. This heating or cooking process is called sterilization — killing the germs. In both cases the canners kill the germs by heat and keep out new ones by simply shutting out all air. You see, the organisms that make foods sour are everywhere. The air is full of them. The sugar that is used in making jelly, jam, and marmalade tends to preserve these products. If you find sugar in a canned food you know that it has been placed there simply to sweeten it. Foods properly

canned do not require sugar or anything else to keep them pure and wholesome.

There is practically no limit to the kinds of foods that may be canned or preserved. The list includes fruits, vegetables, fish, meats, soups, milk, sauces, salads,—in fact almost anything you eat.

Canning increases variety of our table foods. There are very few fruits or vegetables that cannot be raised in the United States; and since by canning these foods it is possible to ship them all over the world and to keep them almost indefinitely, it is possible for the family in Maine to put on their table during a winter blizzard the foods that could be raised only in the very warm and moist parts of the South. For the same reason it is possible for the man who lives in the desert country of the West and Southwest to have the finest fruits, fish, vegetables, and delicacies that our country produces.

Canned foods from foreign countries. Now in regard to the part played by foreign countries in supplying us with canned foods: We are proud to be able to say that the canned foods consumed in the United States are almost wholly produced in this country. The canned foods which are sent from other countries are, for the most part, rare delicacies which are mentioned in the chapter "Tempting Table Delicacies," and a great many of these foreign foods are so expensive as to be out of reach of the average American pocketbook.

In a recent year we find that other countries sent us canned vegetables worth a little more than $1,500,000 and canned fruits worth about $5,000,000. The total value of canned meats imported from other countries was less than $2,000,000.

Now think for a moment how great our own canning industry is: each year the American canners

Shelling peas for canning. Every year the canning industry saves countless tons of foodstuffs from going to waste

put up more than 50,000,000 cases of two dozen cans each. This is over 1,200,000,000 cans—or 60 cans of food for each family in this country—that otherwise might go to waste. And this is saved for our tables for all seasons of the year. In the United States there are about 3,000 canneries at work for us.

When canned fruit excels fresh. Canned pineapples from Hawaii are much better in flavor than the fresh pineapples we buy in the markets. This is because those in cans were picked ripe, while those in our markets were picked green so they would stand shipping and be ripe when they reached this country.

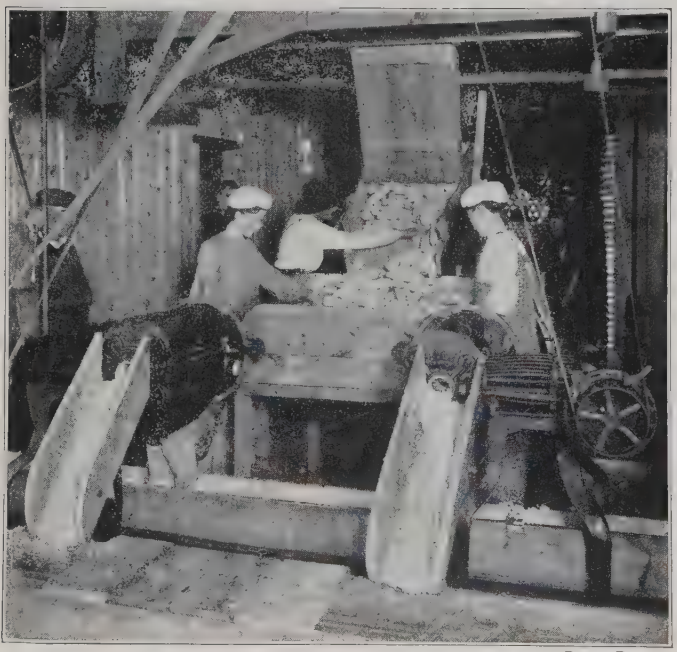
The relation between canned foods and geography. Here is an excellent opportunity to study geography. First let us see from what parts of our own country we get canned foods.

Find Seattle, Washington, on your map. From here we get a portion of our supply of canned salmon. A great deal of this canned fish is packed on the shores of Alaska and much comes from the Columbia River. Now go all the way across the country to Florida. This state furnishes some of our canned pineapple, although the greater part of our supply of this fruit comes from the Hawaiian Islands, where certain large American canning and preserving companies have their own plantations for the growing of fruit and vegetables with which to make their product. A limited amount of canned pineapple now comes from the West Indies.

Next find Michigan. It is from there that we get many different varieties of canned berries and small fruits. Of course there are many other states from which we get the same products, among which are New York, Maryland, Maine, Oregon, Delaware, and Virginia. Also California gives us a wonderful variety of fruits. Indeed, we may say that this state alone produces a greater variety of fruit than any country in the world except our own. It is the foremost canning state of the Union.

As you know, there are many fruits which come from a great many different states. Among these are the pears, plums, and cherries. Strawberries are most easily raised in Oregon, Maryland, New Jersey, New York, California, Washington, Missouri, Michigan, and other northern states, although they do well in practically every other state in the Union.

As for canned vegetables, they are put up in every state. The greater part of the canned corn



Brown Bros.

Assorting corn for the cutting machine in a cannery. A careful selection and sorting out of the products received at the factory insures the consumer canned foods of uniform excellence

is grown in the Middle West—Illinois, Iowa, Ohio, Indiana, Minnesota, Wisconsin, and Nebraska —although choice corn is grown in the West. In the East, New York, Maryland, and Maine play an important part in making up our yearly supply of canned corn and also of tomatoes, peas, and other common vegetables. Our canned asparagus comes mostly from California and her

sister states in the West and from Florida, although some of it is from the Southern and Central States.

Now let us see what we import from other countries. If you will refer to the chapter on delicacies you will find a fairly complete review of the fruits and vegetables which we import.

Take your map and trace to their sources some of the foods that you have eaten recently. This will undoubtedly take you to many foreign lands, especially if your parents are lovers of the dainties we buy from the Old World.

While the United States leads the world in the canning industry, there are, nevertheless, many small canning plants in the European countries. Holland, for instance, has canneries that put up several hundred different foods, which include practically every vegetable obtainable, not only separately, but mixed with other vegetables, with fruits and meats and fish; for example, "mixed peas," "green peas and spring carrots," "beef and onions," "green peas and veal," "anchovies with pimiento peppers and truffles," "chestnuts and sausages," and many other combinations. They also put up a great variety of sauces, soups, potted game, poultry, and sausages.

Holland is by no means the only European country that turns out a quantity of canned foods. France and Italy are important canning countries. France cans mushrooms, truffles, sardines, asparagus, and potted meats; while England is famous the world over for the delicious sauces, ketchups, pickles, jams, and jellies which she exports. It may surprise you to know that over 90 per cent of the canned food England exports she must first buy and ship in from other lands.

Not only in our country, but in Europe too, the use of canned foods is becoming more common with each passing year. That is because the public is gradually learning the truth about the purity and convenience of canned foods.

Putting up foods at home. Those of you who live in small towns and in the country have seen your mothers or sisters "can" or put up the vegetables and fruits from your garden and orchard. Have you ever wondered how the big canning factories do it? At home perhaps you help gather the fruit, berries, and vegetables that are to be canned or preserved. You know how you go out early in the morning, while the dew is still on the grass, and pick whatever is to be put up. You know how these things are prepared for cooking. They must be washed, or hulled, or peeled, or, in the case of some fruit, the stones must be removed.

The next process, you will remember, is to boil the fruit—sometimes with sugar and sometimes without—and now you must look sharp to see that it does not boil over or burn. When the fruits, berries, or vegetables are ready for canning, how carefully mother washes the jars, glasses, cans, or other containers! This is done with boiling water so that they will be thoroughly sterilized—which means to wash away every impurity, to kill any germs in the container, and to sweeten it. Next the cooked food is poured in steaming hot and the top fastened down tight. Now the containers are turned upside down and left for a time, to be sure that there are no leaks and that air cannot get in and spoil the food. Then the canned food is put away in a cool, dark place until needed.

A trip through a modern canning factory. Now we will make a trip through one of the big modern canning factories, where a wide variety of foods are received and put up, and see how the work is done there. The superintendent has agreed to take us through, show us everything, and explain all the processes as we go along.

"Years ago," he says, "we did not encourage visitors to our plant, but we have since learned that the average American is prejudiced against all canned foods not put up by his wife or mother, believing they are handled in an unclean or careless manner. Therefore we are now doing everything

Courtesy of U. S. Dept. Agr.

To make sure that there are no leaks, the careful home canner turns the container, when filled with the steaming hot food, upside down

possible to show our customers how we do our work—where we get the food we put up and how we handle it.

Selecting the foods. "Now let me tell you something of the care we use in the selection of the food

Harvesting tomatoes for the cannery Brown Bros.

we can. At home your mother went into her own garden and took the vegetables from the vine or stalk and the fruit from the tree or bush, sorted them, threw away what she did not wish to use, and put up the remainder in the way she thought best. No one else handled them and she knew they were just what they should be, and that nothing harmful was put into the can.

"That is the good old-fashioned way. Now let me tell you how we select and handle our food.

"We really choose the food before it is planted. Our first step is to find farmers who understand their business, who will raise what we want, and raise it in the right way. The next step is to buy for them the very best seed that can be found. After that

the farmer is instructed as to the proper way to plant this seed and raise the food by men whose business it is to see that our instructions are followed. The right time is chosen for harvesting, which is done in the most up-to-date and sanitary manner.

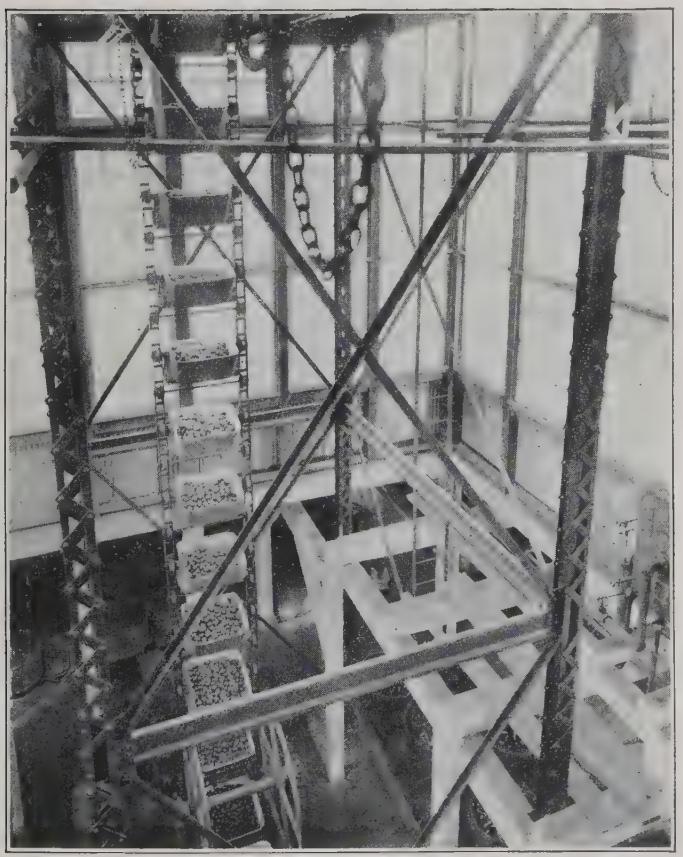
Shipping, cleaning, and preparing foods. "Then the food is delivered by the farmer to our near-by station, where it is carefully sorted and shipped to this plant in our own cars. As a rule, however, the canning factory is located in the district where the produce is grown. Immediately upon its arrival, it is again sorted and sent to the cleaning machines.

"These cleaning or washing machines are large tanks in which the food is allowed to remain until the dirt is loosened. The food is then stirred gently by agitating the water and next sprayed. The force of the spray depends entirely upon the hardness of the food, for the force of water necessary to remove dirt from beets would destroy strawberries or raspberries. Some hard-coated products, like peas, are washed in wire cylinders which revolve rapidly under water.

"While some fruits do not need any further preparation before cooking, there are many that do, and almost every vegetable must go through one or more machines between the washer and the cookers. Peaches, apples, pears, and similar fruits must be peeled and cut in pieces. The pits must be removed from some of the stone fruits.

"String beans must be cut in lengths; peas must be shelled, graded both for size and for quality, washed, and blanched. With us this means parboiling. You see that big vat over there with the wire ladles over it? The peas or other vegetables to be

blanched are put in those big ladles, dropped into the boiling water for the proper length of time, and then



Tomato conveyors. In this manner vegetables and fruits are carried to and from the machines in which they are cleaned and cooked

automatically lifted out. When we are blanching mushrooms or other delicate foods we prepare them in that small vessel you see, and we add lemon juice

and butter to the water in which they are blanched. Fresh, clean water is used for each batch of vegetables.

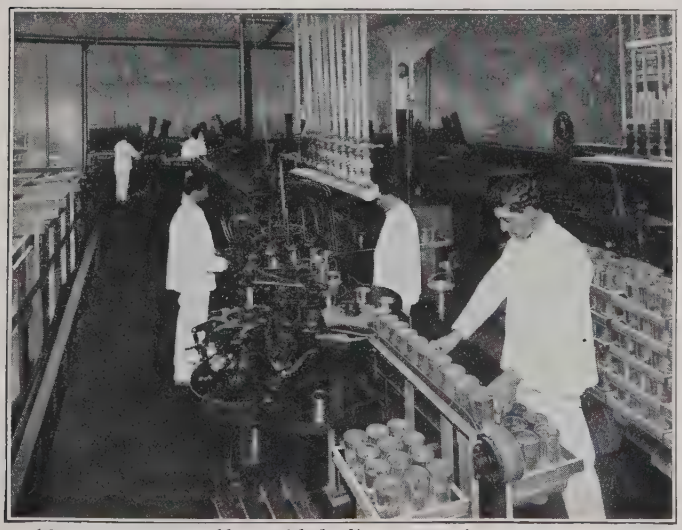
Methods of cooking and canning. "Some foods are cooked in the can and some are already cooked when placed in the can. Fish, for instance, is usually cooked after it has been canned. If you will step over here to these large copper vats, which are heated by steam coils, I will show you how pork and beans and other things already cooked are put in cans.

"Notice this big vat, in which four hundred bushels of the choicest beans are being cooked, and the next one which contains many gallons of tomato sauce. These beans are cooked—boiled—just as

Can-filling machines. These automatic machines are great labor-saving devices, filling the cans with fruit or vegetables direct from the cooker

your mother cooks them. See! They are dumping the beans into another and larger vat. Notice how

plump and white they are. Now they are adding the tomato sauce. Over at that table you will



After the cans are filled with boiling hot fruit or vegetables they are carried on a belt to the compressed air "capper," which automatically clamps on the lids

notice a dozen or more girls cutting pork into small pieces. Now see that machine filling the cans with the beans and sauce with some of the pork added. Now the tops are automatically put on the cans by a compressed air 'capper' which clamps on the top without the aid of solder. This capping machine can seal about eighteen hundred cans an hour. You see that belt carrying the sealed cans into a large trough of boiling water? Should there be a leak in a can, the inspector would instantly detect air bubbles forming upon it and would reject it. This boiling water also serves to sterilize thoroughly the canned product.

"Now the cans are transferred to another traveling belt which conveys them through cold water that cools them again, as the food would not be good to eat if it stayed hot too long.

Preserving peaches. "Those ten steam-heated vats across the room are used for cooking fruits and sirups. In the fourth one they are putting up peaches. A shipment of three cars of peaches all perfectly ripe was received and so we are running them through as fast as possible. If some of them had not been quite ripe, we should have kept them in cool rooms until they were ripened.

"That big machine with a number of slanting screens is the size grader. We first grade our peaches for size. Then they are cut in half, pitted, and passed on to the peelers. One way of peeling them is to steam the peaches and slip the skins off. Another way of peeling them is to dip them into lye, which eats away the skin, after which they are washed in water to remove any trace of the lye. Still another way is to peel them by hand with a knife; but that is a slow method. Steaming is the hardest way, and requires the most care, but we think the result is worth it.

"Our next step is to place the peaches carefully in those big steam-heated vats and cook them as your mother cooks her preserves. When cooked, they are placed in cans and bottles which have been sterilized with steam, and then the sirup is added. After the containers are sealed the peaches go through the same process as beans and other canned foods.

Making salad dressings and pickles. "Like most large factories that can fruits and vegetables, we also put up salad dressings and pickles. We shall now

go to the room where a certain kind of salad dressing is made. We sell many thousand cases of dressing

A busy scene in a great canning factory. Here carloads of cucumbers from the company's patches are being transformed into crisp pickles

each year and at times have three mixing machines working steadily for weeks, combining the ingredients.

"That first machine is the mustard grinder. Into the top of it pours an endless stream of round black mustard seed, and from the bottom flows a thick yellow powder. This mustard is next passed into the mixer, an enormous metal cylinder in which revolve great paddle wheels. These paddles thoroughly stir and mix the various seasonings which are added to the mustard to produce the salad dressing. Finally the dressing is placed in an immense tank, from which it is drawn by taps as it is needed. Some days as many as ten thousand bottles will be filled with the dressing from this tank.

"It is impossible for me to give you any idea of the number of acres of cucumbers which are made into pickles in this country in a single day. Over there are ten carloads of cucumbers soaking in brine—and that will be but a small part of the cucumbers pickled in our plant this year.

"This one plant uses the output of more than twenty farms or 'patches' of cucumbers. When the farmers bring the cucumbers in to the various substations of the factory, they are placed in brine and shipped in special tank cars. At the factory they are taken out, washed, and sorted. Then they are placed in enormous wooden hogsheads which are perhaps sixteen feet deep and twenty feet wide. Into these hogsheads are poured many gallons of brine to cure the cucumbers. After they are cured the cucumbers are sucked out through large pipes and emptied upon sorting tables, where those of inferior quality are culled. All cucumbers that are misshapen or broken, but the quality of which is in no way lowered, are used for chopped and sliced pickles, relishes, and similar products. Those of poor quality are thrown out.

"The next process is the pickling. If sour pickles are wanted, vinegar is added to the cucumbers; and if dill pickles are wanted, great bunches of dill (an aromatic plant) are placed in the vat with the cucumbers. After a certain length of time the pickles are removed and packed in small kegs, jars, bottles, barrels, hogsheads, or other containers ready for shipping. The choice pickles that are put up in bottles are hand packed.

"Many vegetables besides cucumbers and fruits are also pickled.

The importance of the label. "The last process these cans and bottles go through before being

In the soup kitchen of a canning factory. In this room thousands of chickens are being turned into a familiar brand of chicken gumbo

shipped is that of labeling. All our fancy foods we label by hand in order to make them as attractive as possible to the buyer. In recent years the label has become extremely important. Formerly labels were placed on canned foods so that the storekeeper and the customer might easily find the article wanted. Later the label was used as an advertising medium, and still later, with some concerns, as a means to hoodwink the consumer. But the Food and Drugs Act put an end to this. To-day all labels must state plainly just what and how much the can contains. This law is a help to the honest manufacturer and distributor as well as to the consumer."

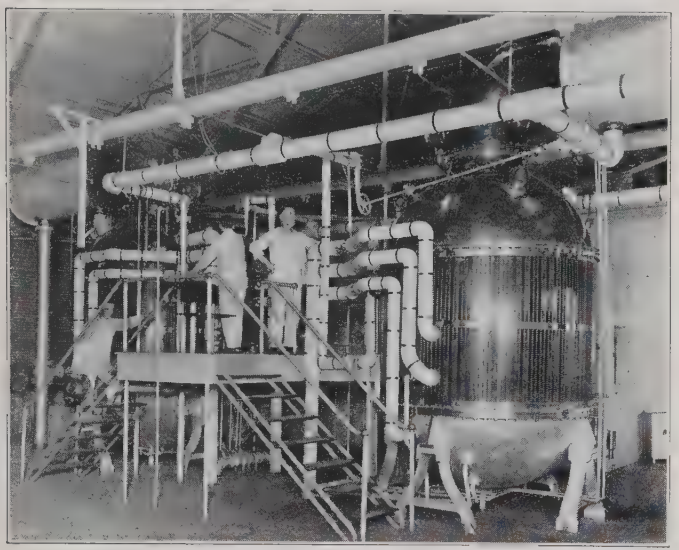
Now you have had a little glimpse of the inside

workings of an up-to-date canning factory. This factory does not can fish, nor milk, nor rare fruits, nor meats except those that are put up with vegetables. It merely takes care of such fruits and vegetables as are most commonly grown in the section around it. But you know of course that it is possible to can practically every food we use on our table. Oysters and hominy are canned, and canned soups are now used all over our country as well as abroad.

Canning milk. We have said nothing about the canning of milk. Of course you know that milk spoils more quickly, perhaps, than any other food, and unless it is kept in a very cold container it is almost sure to sour and thus become unfit for drinking. But the canner has met this condition by working out safe, clean methods for carrying milk in sealed cans. You have no doubt seen your mother use what she calls evaporated milk. She punches two holes in the top of the can; one hole lets in air and the other lets out milk. Now this evaporated milk is merely fresh milk from which the greater portion of water has been taken, then the can sealed and heated to a high temperature, which, of course, sterilizes the milk. Sterilizing keeps milk from spoiling just as it keeps corn or tomatoes or beans fresh.

Condensed milk, which is thicker than evaporated milk, is not sterilized but is merely milk from which a large amount of water has been taken by patented processes and which is then sweetened with sugar sirup. This sweetening keeps the milk from souring. American milk condensers use about 1,300,000,000 pounds of fresh milk each year in making condensed

and evaporated milks. The average price paid the farmer for this milk in a normal year was $1.56 a



Evaporating or taking the water out of fresh milk in these great vacuum pans is one of the processes employed in the making of evaporated and condensed milk

hundred pounds, so that through this industry the American farmer sells each year about $20,000,000 worth of fresh milk that must otherwise spoil or be sold for a price considerably lower.

We now make most of the condensed and evaporated milks used in this country, but it is quite possible that at some future day condensers in Europe may furnish a large portion of it. For in Europe labor is so cheap and the materials used in the production of milk are obtained so cheaply that foreign condensers are able to ship milk to America and sell it at a lower price than American

condensers must ask for theirs. In Europe women and boys and girls work in the dairy barns, milk the cows, and do a great deal of the farm work. They receive low wages, which, of course, makes the cost of producing fresh milk much lower than in this country where men receive higher wages and where it is not customary for women and children to work in dairy barns.

The canner a conservationist. Now the canner not only plays an important part in our civilization by furnishing us wholesome and safe foods which can be stored away in a limited amount of space and used at all seasons of the year, but he is also what we call a conservationist. A conservationist is one who cares for and uses to the best possible advantage any natural resource. Of course, there are no resources quite so valuable or important as our natural and cultivated foods. Suppose, for example, there were no canneries in this country. What would become of the thousands and thousands of tons of fruits, vegetables, fish, and meats in many localities that could not be eaten when fresh because the supply greatly exceeded the demand? We should simply have an enormous waste, and later food would be scarce and very expensive. Our truck farmers and fruit growers too would make very little money except during the season when the market could take care of such supplies as were brought in fresh from the fields or orchards.

The canner takes care of this situation by storing away for future use the immense product of the land and of the sea. Some of these canning plants have many branches or small plants that take care of the fruit and vegetable crops as fast as they

are harvested. For example, one main canning factory has fifty small plants in operation during

Taking care of a surplus product. Assorting and stemming a big shipment of cherries in a canning plant

the season, and there is at least one firm in California that has thirty plants.

Some of these plants will put up from 250,000 to 300,000 cans of food a day. Think what an opportunity this is for the men who grow this food. They are always sure of a market for their products, and the people in the cities and in faraway sections of the country, where food crops are not grown extensively, are sure of plenty of good, wholesome food at moderate prices.

Since our chief reason for canning foods is the fact that they will outlast fresh foods, you will naturally wish to know how long canned foods will keep.

If a can of tomatoes could be kept only a few days or weeks longer than fresh ones it would not pay

Preparing fresh lima beans for canning Brown Bros.

to can them. Therefore it is important to know how long canned foods will remain wholesome and what must be done to protect them.

General Greely's experience with canned foods. General Greely, a famous arctic explorer and once Chief of the United States Signal Service, when asked for his opinion on canned foods wrote the following interesting letter about them.

"You ask me to state the effects of freezing upon canned fruits and vegetables, especially as regards the texture and flavor of tomatoes, corn, and the like. Apples, peaches, pears, rhubarb, green peas, green corn, onions, and tomatoes were all subject to extreme temperatures (over 60 degrees below

zero) and were frozen solid for months at a time. The second summer they thawed; the following winter they froze solid again.

"All the articles named presented the same appearance as though freshly canned, and their flavor was as good when the last can was eaten as in the first month. It should be understood that these were first-class canned foods from dealers of standing and reliability.

"Cranberry sauce, preserved damsons, preserved peaches, and fruit butters suffered certain changes from candying, and the like, which detracted somewhat from their flavor, though not materially so. Dealers in such preserves predicted that such conditions and changes would occur.

"I had also canned turnips, beets, squash, and carrots, as well as pineapples, cherries, grapes, clams, shrimps, and crabs, which, although not subject to such extreme temperature as the foregoing, yet froze and thawed repeatedly without injury. No can of any kind, except a few—say half a dozen—of fruit butter, was ever burst by action of heat or cold. No illness of any kind occurred prior to our retreat and those most inclined to canned fruits and vegetables were the healthiest and strongest of the party.

"I have written thus fully in answer to your letter from my conviction that the excellent quality and variety of canned provisions contributed materially to the unequaled health of my command during the two years we passed in unparalleled high latitude. The importance of good canned fruits and vegetables to parties unable to obtain the fresh article cannot be overrated, and so I speak with no uncertain tone on the subject."

Canned foods and arctic explorers. Seventeen years after the rescue of General Greely from the arctic ice by Commander Schley, Lieutenant Peary on his dash to the North Pole discovered General Greely's old camp and found most of his canned provisions perfectly good.

Professor Donald McMillan of the Peary expedition gives us still further proofs of the service that canned foods rendered the explorers. On one of his first trips out from Cape Sheridan with a sledge and Eskimos he skirted the east coast of Grant Land and Grinnell Land (if you refer to your big map you will find that Cape Sheridan is at the east end of Grant Land on the Lincoln Sea—just west of Peary Land in the north of Greenland) and slowly made his way to Fort Conger. This fort lies on the north coast of Grant Land on Lady Franklin Bay in about 60° W. longitude. Near this point he discovered one of General Greely's old camps of the expedition of 1881–1884.

"Here," he writes, "I found relics, all of which were in the same condition as when they were discarded by the ill-fated members of that expedition. I found coffee, hominy, canned rhubarb, canned potatoes, breakfast food, and all sorts of supplies. They were just as good as ever and I practically subsisted on them all the time I was there."

Professor McMillan braved the dangers of a winter in that terrible country that he might study its natural features, its climate, and its people. Can't you see him behind his team of "huskies"—Eskimo dogs—wrapped in furs to his eyes and emitting great white breaths! Quite likely he had been traveling all that day over the endless stretch of snow-covered

piles of ice that rose on all sides. No doubt he was stiff and numb with cold and dared not remain on the sled but had to tramp for many weary miles beside the silent Eskimos.

And the camp itself—the old Greely camp! What was that like? Were there tents buried in the snow, were there caves, or were there igloos, those queer little ice houses in which Eskimos live during the arctic winter? Can you imagine Professor McMillan's thoughts as he opened and sampled the canned food?

How long will canned foods keep? Now that we know how much cold canned foods will stand without serious loss in flavor or food value, the next question that arises is: How long will canned foods keep? That is a difficult question and the answer to it, no doubt, depends upon the kind of food canned. But here is a story that shows us how one vegetable will keep. There were found in La Crosse, Wisconsin, in 1913, two cans of squash which had been canned twenty-eight years before. These two cans were kept at an even temperature for another year and then opened in March, 1914. The contents were found sweet and wholesome.

Home canning encouraged by government. Because of the recognized value of canned foods both the national and state governments are doing much to encourage their use and to induce families in the country to put up their own vegetables and fruits when possible. In the South especially, a great work has been done in this respect, and as a result many families of the South now have a greater variety of food on their tables the year round than ever before. But it is the poor who will probably profit most by

the government's instruction in the art of canning.

In the counties of many states tomato-raising and

Courtesy of Extension Department, Alabama Polytechnic Institute

Preparing for a canning contest. The county agent demonstrating the government method of tomato canning in a rural community

canning contests are now carried on each season. Seed is furnished to the superintendents of the various schools to be distributed among the girls who are willing to raise and can the tomatoes. Then in midsummer there are canning demonstrations and contests held by the county agent under the direction of the state agricultural college and the United States Department of Agriculture.

Don't you think that if you were furnished seed, ground, and instruction, you would like to try raising food and canning it yourself? Would n't you like to win the prize for the best canned tomatoes? Perhaps the United States government is helping the boys and girls in your neighborhood now. It may be that your public schools are already interested in corn clubs and canning clubs.

Chapter XXI

DRIED FRUITS

Drying a cheap and simple process. One of the best means of adding to our food supply is the drying of fruit. The principal reason why this is true is that the drying process is simple and comparatively cheap. Another reason is that dried fruits generally retain, to a remarkable degree, the delicious flavor of the fresh fruit.

These things are far more important than they might seem to be at first glance. Only when forced by necessity will we eat that which does not appeal to our taste. Many nourishing foods are cheap, therefore, because they are neither palatable nor attractive. It is fortunate that a food delicious in flavor, rich in nourishment, and of excellent keeping quality is to be had at a relatively low price.

At first it is not easy to understand why a food having so many merits should still remain cheap. But if we consider the nature and source of certain of our dried fruits the reason is easily found. For instance, in localities favorable to the growth of the prune, the date, and the fig enormous crops of these fruits are produced. Only limited quantities of them can be used at home or shipped to near-by markets when fresh. Therefore drying the fruits not only prevents great waste but continually extends their use, and makes possible a reasonable price.

Drying a fruit widens its use. If the prune could be had only fresh, canned, or as a preserve,

it would probably be little known outside the localities close about the districts in which it is

Drying figs on straw near Karabunar, Bulgaria. Figs would be little known outside of the localities in which they are grown without the aid of the drying process

grown. Certainly this is also true of the fig and the date, which in dried form have almost a world-wide distribution.

Then, too, there are certain varieties of other fruits which are excellent when dried, but which, in other forms, are not suitable for commerce. Raisin grapes head this list, with Grecian currants second.

Drying prevents waste. The larger part of our immense volume of dried fruit is made from crops raised for that especial purpose. But it is quite true that growers sometimes resort to drying in order to save the surplus of an unusually heavy fruit crop from spoiling. This is probably done

more often with peaches and apples than with any other fruits.

Suppose the peach trees in California,—which furnishes practically all of our dried peaches,—are loaded with a bumper crop and that sugar, glass jars, and tin cans are uncommonly high. This condition is certain to reduce greatly the canning of peaches, by both housewives and commercial canners. In such a situation one thing is reasonably sure to happen. The price of peaches will drop until there is little or no profit in harvesting them. You will remember that neither sugar, glass, nor tin is required in drying fruits. Therefore, the heaviest items of expense are cut out. So, instead of leaving a large part of his peaches to rot on the ground, the grower finds a way out of his difficulty by drying the fruit.

In a normal year the United States produces about 300,000 tons, or more than 500,000,000 pounds, of dried fruits. This would give about 6 pounds of fruit to each man, woman, and child in our country. Nearly 85 per cent of this comes from California. When trying to realize just how much this means in the problem of feeding the nation you should remember that dried fruit is a very compact food and that there is much more food value in one pound of dried fruit than there is in three or four pounds of the same fruit fresh.

A blessing to Indian and pioneer. Dried fruits have been used in America from aboriginal times. The Indians were drying apples and berries when the white man came to this country. Of course their way of doing it was as crude as their way of

drying meat, but the product was an important addition to their meager food supply, especially in

Brown Bros.

Drying time on a great California peach ranch. In this way the surplus of a bumper crop of peaches is being conserved or saved from waste

winter. This was also true of the early pioneers of this country. Without their stores of dried berries and other wild fruits their winter food supply would have been scant and unattractive. In fact, their only "sauce," except in summer and fall, was made from dried berries and other dried fruits.

America dries fruits for the world. It is doubtful if there is a country in the world to which America does not send dried fruits. We yearly export over 80,000 tons, or more than 179,000,000 pounds of dried fruit. Contrast this with the 26,500,000 pounds we import. We send whole shiploads of dried fruits to England, France, and Germany, and

lesser quantities to Russia, Italy, and Australia, and to various countries of Asia, Africa, and South America.

What the world sends us. In return we receive from abroad chiefly the smaller dried fruits. Raisins we get from Spain, Asiatic Turkey, and Greece. Currants we buy from Greece. Dates, which require a hot, dry climate for growth and ripening, come from Northern Africa and Western Asia. Persia leads in the production of dates, but shipments come from Turkey also. Turkey is our chief source for figs, although that fruit may be grown in almost any mild climate. California is now producing annually from 12,000,000 to 14,000,000 pounds of excellent figs, and fig culture is growing more popular in that state every year. At present, however, almost the entire crop is grown in a single valley of the state. Considerable quantities of ripe olives, salted and dried, come from the eastern Mediterranean nations, and we buy dried mangoes from Mexico, dried persimmons from Japan, and a certain kind of raisin from China.

Secrets of fine flavor in dried fruit. Before explaining the process of fruit drying a word should be said about the wonderful flavor of fruits properly dried. The secret of this fine flavor lies in the fact that fruits for drying are allowed to become fully ripe before being picked. For this reason, to a person living at a distance from the orchards, sauce made from dried apricots seems far richer and finer in flavor than the fresh fruit. This is because an apricot, to stand shipping, must be picked when only partially ripened, and therefore never reaches its finest quality and flavor. So the

distant consumer does not know how delicious apricots really are.

The same is true of many other fruits. In the last day or two before an unpicked berry or fruit reaches perfect ripeness it improves, perhaps a hundred fold, in flavor. The prune plum is allowed to ripen so perfectly that it falls from the tree of

Brown Bros.

Apricots drying. The dried fruit is superior in flavor to the fruit picked for shipping because it is not gathered until perfectly ripe

its own accord. Here is the real secret of the richness and sweetness of the dried product.

Two ways of drying fruit. Fruit may be dried in the sun, or in evaporators built for that purpose and heated by artificial means. Sun drying on a commercial scale is possible only where there is a long season without rainfall or heavy dews. Most of our evaporated fruits, except apples, come from Oregon and Washington.

Two classes of California fruits. The California fruits are divided into two classes, cut and uncut. The cut fruits,—again excepting apples,—are those which are split in halves before drying. Peaches, apricots, pears, and nectarines are treated in this manner. The principal uncut fruits are prunes, plums, raisins, currants, and berries.

Removing the peel. Let us first study the treatment of cut fruits from which the skin is removed before they are halved. The fruit has been allowed to ripen fully and special care has been taken in picking and handling it to avoid bruising. It is now dipped into a solution of lye, rinsed in pure water, and run through brushing machines which remove the skin. The action of the lye solution weakens the skin so that it is easily removed by the brushes. This "peeled" product has become extremely popular with the trade and the public.

Cutting and stoning the fruit. After being peeled, the fruits are automatically cut in half by revolving knives. Then they are automatically conveyed to a kiln with wire-mesh shelves, and there treated with sulphur fumes. Both the bath in the lye solution and the "fuming" are considered decidedly cleansing and wholesome. They are really a sort of insurance against the development of all kinds of germs. Unpeeled dried fruits are fumed in the same manner as peeled fruit.

Of course the stones or "pits" are removed from all cut fruits at the time of cutting. The pits of freestone peaches drop out as the two halves fall apart after the knife has done its work. The pits of the clingstones and the cores of other fruits have to be cut out with spoonlike knives.

Drying fruit in the sun. The fruit is dried in large, shallow trays. During the season acres and

Drying fruit in the sun. The fruit is placed in large, shallow trays, which in the drying season in the fruit-growing sections of California cover many acres of ground

acres in the dried fruit districts of California are covered with these trays spreading their fragrant burdens of delicious fruits to the rays of the sun. Nearly all the dried fruits from California are sun-cured. When the fruit is partially dry the trays are stacked in piles about ten feet high and the fruit left to cure more slowly so it will not become hard. Next it is placed in bins or boxes to go through a sweating process. Then it is ready for packing and shipment.

How uncut fruit is cured. Now let us consider uncut fruit and follow a crop of prunes through the curing process. This is not unlike that already described. The thoroughly ripened fruit is carefully gathered and given a bath in a solution of lye. Then it is at once rinsed in pure water.

The purpose of this bath is to "cut" or thin the skin so that it will not become like a thick rind as it dries, and to prevent the prune from "hot-curing." As a result of their dip in the lye solution the prunes cure evenly from skin to pit and the skin acquires a delicacy of texture which makes the fruit much more palatable. After being rinsed the prunes are placed in trays to dry in the sun. Then comes the slow curing in the stacked trays and later the sweating in the bins.

Finally the prunes are "processed." The most modern device for doing this is a wire-mesh conveyor belt running in a long and rather deep box. Jets of live steam and of hot water play upon the prunes as they take their ride on the conveyor. With this method the water is not used more than once. When the prunes have passed through this final bath they are not only thoroughly clean, but soft and pliable for packing into the boxes and other containers in which they are to be sold to the public. The fancy boxes are "faced"; that is, the prunes of the top layer are arranged in even rows and carefully pressed into place.

The dried prune is produced from a certain variety of plum which is grown especially for this purpose. There are other kinds of plums used for drying, but these are known in our markets as dried plums. The United States produces annually about 140,000,000 pounds of prunes. Most of the prunes used in this country are grown in California and Oregon, but we import a few fancy grades from France, Bulgaria, Serbia, and Turkey.

Raisins are possibly the best known dried food we have. The greater part of the raisins consumed in

this country used to come from Spain and Turkey. Extra fancy Malaga cluster raisins are still imported from Spain and we also import some Turkish sultana raisins. But California alone now produces many times as many raisins as Spain. The yield of one valley alone in the state is more than double the quantity of raisins produced in that country.

In a single year the United States produced 250,000,000 pounds of raisins. Although our exports of raisins are greatly in excess of our imports, Spain and Smyrna send us each year from 2,000,000 to 4,000,000 pounds. Yet, if we divide the number of pounds of raisins eaten every year in this country

Brown Bros

Drying season in the California raisin district. The ripened raisin grapes, like other fruits to be dried, are put in shallow trays and placed in the sun

by the total number of people living in it, we find that each person consumes only 1.5 pounds a year.

In Great Britain the average consumption in a single year is 5 pounds for each person. But the people of this country are beginning to learn the great food value of raisins. So no doubt within a short time we shall be able to say that each American eats as many pounds of raisins a year as does each person in Great Britain, Spain, or any other Old World country.

A box of raisins ready for the wholesaler

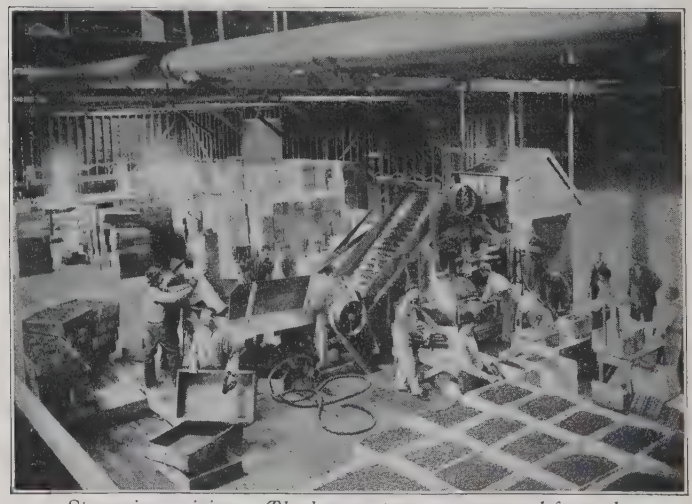
Raisin grapes are allowed to ripen on the vines, and in Europe the stems are cut part way through so that the clusters of grapes may begin drying slowly on the vine.

After the raisins are cut from the vines they are placed on trays and left for a time to dry in the sun. They are then stacked to cure more slowly. After they are sufficiently cured the raisins are taken to the packing house and packed according to varieties and grades.

The different kinds of raisins. "Cluster raisins" are the finest raisins sold. They are in the original state and are put up in fancy boxes or paper cartons. Most raisins are sold loose or stemmed and shipped in large boxes or other containers. Most of the Muscat grapes which reach the consumer are in

the form of seeded raisins. The smaller "cooking" raisins are known as the sultana and Thompson seedless. These are small seedless varieties used in cakes, breads, pies, and puddings. Bakeries and mincemeat factories use large quantities of them.

Seeding and packing raisins. Raisins that are to be seeded are first put into a room in a dry heat of 140° F. and left for from three to five hours. Following this they are run into chilling rooms and thoroughly chilled. This loosens the cap stems so that they may be easily removed. The larger stems have already been separated from the raisins by a very nervous machine somewhat like an old-fashioned grain separator. After the cap stems have been removed, the raisins are passed through cleaning



Stemming raisins. The larger stems are removed from the raisins by machinery

machines. In these machines they are automatically washed and brushed to remove the dust and dirt.

Next the raisins are put into a room with a moist temperature of 130° F. This brings them back to

Packing raisins for market. The raisins are weighed and then packed in paper cartons and fancy boxes

their normal condition. Now they are passed through a huge seeding machine, which can remove the seeds from twelve tons of raisins a day. The principle of a seeding machine is a rubber roller which revolves against a roller having minute teeth, or points. These teeth penetrate the raisins, which are fed from a hopper, and force the seed against the yielding surface of the rubber roller. As soon as the pressure is released the rubber springs back into place and drops the seeds. At the same time the roller with the mass of raisins in its teeth is mechanically "combed" and the raisins removed before it completes a revolution ready to receive from the hopper another "feed" of unseeded raisins.

Now the seeded raisins pass down chutes to the

packing tables, where they are weighed and packed into paper cartons of various sizes and designs. If raisins are properly prepared they will keep their good qualities for many months.

The "dried currant" from Greece. One of the most delicious raisins is not known as a raisin at all but as a currant. This is the "dried currant" of Greece of which the shade-dried Vostizza is the finest type, with the Patras ranking second. Next in order of grade or variety come the Provincials from the west coast and the Calamatas from the southern tip of the country. The word "currant" is a corruption of "Corinth."

The Greek currant graders become so skilled in their work that when blindfolded one of them can separate a mixed lot of samples containing a number of grades without making a single mistake. We get small quantities of dried currants from California and Australia, but the industry in these places is only just beginning.

The world's output of raisins. Like other dried fruits, raisins are shipped virtually to all parts of the world, both by the United States and by other raisin-producing countries. The accompanying table shows about how many pounds of raisins each country produces in a normal year.

California	224,000,000
Spain	31,360,000
Australia	15,000,000
Turkey (sultanas)	11,200,000
Greece (currants)	354,000,000

Dried berries no longer a home product. Besides the fruits named, various berries are dried and marketed in bulk and packages. Dried raspberries, cherries, blueberries, loganberries, gooseberries,

and other small fruits come from our Southern and Eastern States, and also from Idaho, Oregon,

Brown Bros.

Packing figs at Smyrna. Because of the long journey they must make figs imported to our country are dried and packed with great care

Washington, and others of the Western States.

Years ago most families living in the country dried raspberries, blueberries, blackberries, currants, and other small fruits for home use, sometimes with and sometimes without sugar added. But now it is not only cheaper but more convenient to buy these foods from the grocer. The fact that modern methods of fruit drying insure a high standard of cleanliness adds to the popularity of the commercial product. As far as possible the fruits are handled entirely by machines.

Figs one of our earliest imports. The fig tree has furnished food for man since the dawn of history and probably long before. Figs were eaten

in America long before the signing of the Declaration of Independence. In fact, they have been imported into this country for hundreds of years. While the dried fig is by far the more popular, we also use a large quantity of figs stuffed, preserved in sirup, and in maraschino. Fresh figs spoil quickly and cannot be shipped any great distance except when handled with the greatest care. This makes the fresh fruit rare and expensive except in localities near by the fig-growing districts.

Figs are raised in California, Texas, and Louisiana, where the industry is growing rapidly. All of our American dried figs come from California. But we are still compelled to import the greater portion of the figs we use. The most of our imported figs come from Turkey, Portugal, and Spain, although Greece and Italy export some to this country. Those from Portugal come packed in quaint straw mats and are used mainly for manufacturing purposes. The figs from Spain are of a lower grade.

Candied fruits from the Old World. We also import crystallized, or candied, products from the Old World. Candied citron is from the countries bordering the Mediterranean Sea. But lately we have imported large quantities of this peel in brine and crystallized it here. Candied kumquat, a fruit much like a small orange, comes from China. From France we get candied, or "glacé," cherries, grapes, and other fruits; also "Angelique tubes," crystallized plant stalks similar to rhubarb but hollow.

These crystallized, candied, or glacé products are used as sweetmeats and as flavoring in cakes, puddings, and other confections. While the larger part of what we use is imported, much candied orange,

lemon, and citron peel is made in this country.

Crystallizing fruits is a slow and painstaking process and one requiring no small amount of skill.

Candied fruit. This delicacy, which is prepared by a slow and painstaking process, is mostly imported

The aim is to saturate the fruit or peel completely with sugar. To make the sugar permeate to the center of a fruit is by no means an easy task. In order to do this the fruit is put into three different sirups. Sometimes, when only a small quantity is to be crystallized, each piece before being placed in sirup is pierced with copper needles. These needles are not affected by contact with the acid of the fruit. The larger the fruit the more necessary it is to use the needles. When a large quantity of fruit is to be treated this method is slow and vexatious. About the same result is accomplished by plunging the fruit into a hot bath. This opens the pores of the skin, relaxes the flesh, and makes it possible for the hot sirup to reach the center of the fruit. The first sirup is light, the next a little heavier, and the third very heavy. By the time this treatment is completed the fruit has been in its sirup bath several weeks. When taken out it has a beautiful gloss.

Chapter XXII

CONDENSED FOODS

A dehydrated dinner. Suppose you were invited to a dehydrated dinner. Would you not be half afraid to accept? No doubt many would hesitate because they would not know what sort of a dinner to expect.

Dehydrating is a process by which the moisture is drawn from food, without taking anything else with it. For instance, from a dehydrated strawberry all moisture has been taken—nothing else. It has the same color, skin, smell, and taste as when fresh. When the moisture is returned it will have the same appearance, smell, taste, and color it had before dehydration.

But if you were to sit down to a dehydrated dinner, what could you have? You could start with that wonderful pea or lentil soup used by the German army. This is a powder and is put up in packages in the shape or form of a sausage. Or perhaps you would prefer a different kind of dehydrated soup, powdered mock turtle or tomato bisque, for instance, or maybe bouillon made from a cube.

Yes, you could have a dehydrated relish and a dehydrated salad. In these you would find dehydrated peppers, onions, celery, horseradish, and garlic.

Do you like omelet? Very well, then, you could have a fine yellow omelet made from powdered or dehydrated eggs. And what a choice you could have of dehydrated vegetables—corn, tomatoes,

peas, cabbage, beets, spinach, potatoes, beans, carrots, cauliflower, onions, and asparagus tips!

Your dehydrated dessert might include bananas, peaches, pears, apples, cranberries, strawberries, or raspberries. Or there might be a pie made of dehydrated rhubarb or cherries, or a cake which would contain dehydrated eggs and which would have been mixed with dehydrated milk.

In your powdered coffee you would use condensed or evaporated cream. Finally you might take some ice cream made from ice cream powders, flavored to suit. All this dinner you could easily carry in one pocket. Or, you could take an entire meal in the shape of one dehydrated chocolate cube or a malted milk tabloid.

Dehydrating foods. Now let us see what these dehydrated foods are and how they are prepared. Let us begin with potatoes, which are put into a large hopper, with a revolving file-like wheel at the bottom, to scrape off the skins. At the same time they are scoured in running water. From this hopper they pass on a traveling belt between rows of girls who remove the eyes and parts of skin which the machine failed to get. The belt next carries the potatoes through a long tunnel-like box where sulphur fumes thoroughly sterilize them, killing any germs which might cause them to rot or turn black. From the sulphur box the potatoes are passed to the slicer, where they are sliced. After this process they are placed on trays and put into the dryer, where the dehydrating takes place.

The first process in dehydrating is to draw all the moisture from the air in the dryer. This is done first by passing the air over ammonia coils, like those

used in cold storage plants. This chilling causes the moisture in the air to condense and collect on the

A group of condensed foods. Dried mushrooms, powdered milk, and dehydrated corn before and after adding water

coils. After the air has passed over these coils it is absolutely dry, but cold. The next step is to heat that air. This is done by passing it over hot coils, which bring it to a temperature of from 80° to 180° F. The temperature depends upon the kind of food that is to be dehydrated.

With the aid of a strong blower the hot air is forced through the compartments containing the potatoes or other products, and this draws the moisture from them. This ends the process. Dehydrated potatoes are sometimes powdered and made into potato flour.

Peaches and berries. The process of dehydrating peaches is very similar to the dehydration of potatoes, except that, instead of being sliced, the peaches are cut in half, and the pits are removed. In dehydrating berries, such as cranberries, strawberries and raspberries, washing takes the place of peeling and slicing.

Powdered milk. Probably the making of powdered milk or milk flour is the most interesting of all dehydrating processes. Fresh milk is forced by compressed air through fine nozzles, so that it is sprayed out in a mist. Directly below the nozzles are openings sending up very hot air. The instant the milk mist strikes this hot air it is turned into steam and carried up through a funnel-shaped cone into a large room or cupola. The sides of this room are hung with screens of woolen fabric or mill gauze, through which the hot air and steam pass. But the solid particles of the milk are caught by it and drop into bins.

Condensed or evaporated milk. At the outset, it is well to understand the difference between powdered or dehydrated milk and condensed or evaporated milk. We learn that milk contains about 90 per cent water. For making condensed milk, the milk is first strained, skimmed in centrifugal separators, and then heated to a temperature that will drive off the gases of the milk and destroy the germs. Next it is strained, and, if the condensed milk is to be sweetened, a quantity of granulated sugar is added. The milk is then placed in an enormous egg-shaped copper vessel from which all the air has been pumped to form a vacuum. The vessel, which has a capacity of about 1,500 gallons, is heated by steam and evaporation takes place in from an hour to an hour and a half. The vessel may be thus filled and emptied six or seven times a day. With condensed as with powdered milk, only the very highest quality of milk is used. It is furnished to the condensing plants by farmers who make it their business to supply this demand. This is

done under rigid inspection. Like the other condensed foods, evaporated milk will keep indefinitely.

Wrapping bouillon cubes, one of the best known and widely used of the concentrated foods

Other concentrated foods. There are still other concentrated foods, with which you are no doubt more or less familiar. They are put up in tins, in capsules, in essences, in tabloids, and in paste. Chicken gumbo, meat tablets, beef capsules, tea tablets, date-and-nut paste, and mushroom powders from France are among the less familiar concentrated foods.

A boon to explorer, hunter, soldier. There are many reasons why foods are put up in this manner. One reason is the economy of space and weight. For long exploring and hunting trips and for armies they

are very valuable. One man can carry enough powdered and dehydrated food to nourish him for months.

If you have ever gone camping, fishing, or hunting in a remote part of the country you will know that it is often impossible to secure fresh foods of any kind during your stay, with the possible exception of fish, game, wild berries, or wild plums. It is difficult to carry fresh foods, such as vegetables and eggs, on such an expedition. Then condensed foods are a great boon, for even canned foods are heavy in comparison with the dehydrated varieties.

RELATIVE PROPORTIONS OF DEHYDRATED FRUITS AND VEGETABLES

1 lb. of dehydrated soup greens is equal to 30 lb. of fresh
1 lb. of dehydrated cauliflower is equal to 25 lb. of fresh
1 lb. of dehydrated celery is equal to 20 lb. of fresh
1 lb. of dehydrated tomatoes is equal to 20 lb. of fresh
1 lb. of dehydrated cabbage is equal to 18 lb. of fresh
1 lb. of dehydrated apples is equal to 8 lb. of fresh
1 lb. of dehydrated horseradish is equal to 7.1 lb. of fresh
1 lb. of dehydrated raspberries is equal to 7 lb. of fresh
1 lb. of dehydrated garlic is equal to 2.8 lb. of fresh

Other important reasons for the use of condensed food are that it will keep indefinitely, and that it can be put up in clean, cheap, and convenient packages. The condensing of food makes it easier and less expensive to handle.

It is but natural, then, that the governments of the various nations should be heavy buyers of this kind of food. In a dash for the North Pole, you can easily imagine the saving in space and labor which a small jar of powdered eggs would offer over three or four dozen fresh ones. Moreover, danger of freezing or spilling would be done away with. What a wonderful thing it is for the explorer to be able to carry the equivalent of many gallons of soup in a small,

convenient package. For the use of soldiers it would be difficult to overestimate the value of condensed foods.

Use of condensed foods. Of condensed foods the three great staples — powdered milk, powdered eggs, and powdered potatoes or potato flour — are sold almost entirely to the big users. They are seldom handled over the retail grocer's counter, save at the most remote outposts of civilization. Dehydrated fruits and berries are growing in favor, because we are able, by adding a little water to them, to make products very much like the fresh article, with little loss of flavor or nutriment. Chemists and other scientists have proved that man can live entirely on these concentrated foods and be properly nourished. In European countries concentrated foods have for years been used and they will no doubt win their way into favor in this country.

While we have learned most of what we know about preparing these condensed foods from the Germans, American manufacturers have sold many thousands of pounds of condensed foods to Germany.

Polish foods. In Poland, in Central Europe, fruit extracts are made from plums, apples, and pears. The people of that country do not have a great variety of fruit and what they have is consumed almost entirely at home. They have little or none for export. They have a rather peculiar method of preserving prunes. They make a prune paste, somewhat similar to that which we import from Bohemia in barrels, and put it up in round loaves lightly rolled in flour and allowed to harden. It will keep in this manner for a long time, and is usually eaten in slices like cheese with bread.

The Poles have an equally original method of putting up beets. The beets are cooked, skinned, and then placed in large vats or tubs with vinegar and spices and allowed to ferment. These, too, will keep indefinitely and are considered a great delicacy. These sour or fermented beets are known by the name of barscz. Almost every nation, province, or state has its own peculiar foods, of which this is a good illustration.

Chapter XXIII

COFFEE

The popularity of coffee. There are few foods about which consumers are usually so particular as they are about coffee. People who enjoy this beverage at all are likely to regard it as the most delicious drink that has found its way to the tables of civilized man.

Coffee a restaurant "drawing card." Certain high-priced restaurants and hotels have catered to this highly developed taste to such an extent that their popularity practically rests upon their ability to hit the taste of their customers in this one particular. In other words, the excellence of the coffee served is their "drawing card." Considered from this viewpoint, the coffee served in these places is the most important item on the menu and any variation in its quality is a matter for serious thought on the part of the management. In many instances, a poor brand of coffee has turned thousands of dollars a month away from the cash drawer of a large city restaurant. Likewise the serving of coffee of a high standard of excellence, day after day, has driven more than one restaurant out of the ranks of the poorly paying into the highly profitable class.

Dealer's success depends upon quality. The same sensitive taste as to the quality of the coffee served in the home may be noted in nearly every family that uses it. This fact has a big trade significance. It means that importers, jobbers, and

retailers in foods must give special attention to this product about which the general public is so particular. The wholesaler realizes that if he can make his coffee department especially strong, his house is thereby placed in a good competing position. It is doubtful if there is any one article, other than coffee,

Loading a coffee ship at Santos, South America. An early stage in the long journey of one of the most popular articles brought to our tables from foreign countries

on the food list upon which is centered so much care by all who traffic in foods. In view of this fact it is interesting to note that the price of coffee is not subject to the extreme changes that affect most foods about which the consumer is particular. The choicest coffee to be had in the market, the kind bought by persons of great wealth who consider quality without regard to cost, does not command a

startling price. At least there is no such difference in the prices of coffees that there is in the prices of teas. Almost any fancy grocery in a large city, a store patronized chiefly by people of wealth, carries teas that sell at several dollars a pound. Probably the most exclusive grade of coffee carried in this class of stores does not sell for more than sixty or seventy cents a pound.

The first coffee drinkers. There are many stories as to who first discovered the food value of coffee. Here are two of the most interesting and the most likely to be true. In Europe this important discovery is usually credited to the inmates of an old monastery in Arabia. The monks had noticed that their goats after browsing upon coffee berries were unusually lively. Prompted by curiosity they decided to taste the berries and find out for themselves whether they would be affected in the same way. Accordingly they first tried chewing the berry, but the result proved unsatisfactory. Next they boiled the berries but were again disappointed. They felt quite sure, however, that the berries should be cooked in some way, so they tried roasting them. To their delight they found that this gave the berries a fine flavor. For some time they continued to chew the roasted berry. Finally one of the younger monks brewed a delicious and stimulating drink by boiling the roasted berries after pounding them in a mortar. Very soon coffee became the most popular drink at their meals. Pilgrims to whom the monks gave shelter and food were pleased with the strange but fragrant beverage served them at the monastery. They spread its fame wherever they journeyed and thus the use of coffee was extended.

Our second story relates that coffee roasted, powdered, and made into paste balls has been familiar to the Ethiopians of Northern Africa from an unknown time. These balls were eaten without further preparation. Coffee reached Abyssinia in the latter part of the thirteenth century and traveled to Arabia about two hundred years later. From there it was distributed to the world.

Origin of "Mocha" coffee. Coffee was originally shipped from the port of Mocha, to which it owes the name "Mocha." But for many years none has been shipped from that port, which has been closed by drifting sand except to native boats. This name, however, still clings to a certain kind of high-grade coffee. Abyssinia now ships a grade of Mocha, and much of that kind of coffee is shipped from Aden, a British port in Arabia.

Mandheling and Ankola coffees. Undoubtedly the choicest and finest coffees of to-day are grown in the Dutch East Indies, on the Island of Sumatra. They are known as Mandheling and Ankola. These coffees were formerly known as Old Government Java, because the coffee was picked from the different plantations, cured, and at regular periods collected by the government and shipped to Amsterdam, where it was sold at auction.

The coffee countries. There are numerous grades of coffee grown in many different countries. The various countries of the world consume in all about 2,500,000,000 pounds each year. This coffee is supplied by Brazil, Colombia, Venezuela, Guatemala, Costa Rica, Ecuador, Salvador, Mexico, Porto Rico and other islands of the West Indies, Java, Sumatra, Ceylon, India, Arabia, and Abyssinia.

If you turn to the map of the world and note carefully the position of the coffee countries, it will help you to realize the remarkable geographic range of coffee production. In this study of the map you will learn another interesting fact about the countries which contribute to mankind's supply of coffee: that is, that South American countries now play the leading part. Coffee is the star crop of tropic America.

On a great coffee plantation. The United States is the largest coffee consumer. We buy in a year about 1,000,000,000 pounds of coffee. Of this Brazil supplies about 75 per cent. For this reason it will be interesting to take a look at the plantations there.

The coffee tree, or shrub, is produced from a seed. The seedlings are transplanted when small and the tree grows to a height of eight to fifteen feet. It produces a crop about five years after the planting of the seed.

The leaves resemble those of the laurel, and the flowers are not unlike jasmine blossoms and are very fragrant. A few days after their opening the flowers disappear and in their place come clusters of green berries which when ripe are a bright red. They are ready for picking in about six or seven months after they appear. As the time for picking approaches, the berries shrivel and dry. Each normal berry contains two coffee beans.

Here, however, enters a most interesting exception. Probably you have more than once seen a sign in a retail grocery calling attention to "Peaberry Coffee" and have wondered what was the especial peculiarity of that variety. The fact is that it is not a distinct variety at all. Had you looked closely you would have noted that the berries were round instead

of flat. These double or undivided berries occur at the end of the branches where they are not as well

Coffee picking in Brazil. At this time men, women, and children are all busy at work gathering the bright red berries

nourished as the others which get first chance at the supply of plant food. The result is that these tip-end berries are stunted while their more favored companions develop into twin or "flat" beans. The "peaberries," however, are quite numerous and a very acceptable article of trade, having as much strength as a fully developed coffee bean.

Coffee is picked by men, women, and children who carry baskets into which they put the fruit. When the baskets are full, the coffee is dumped in heaps, then loaded on wagons and carted to the drying stations. After the beans are thoroughly washed they are spread in the sun to dry, either in large shallow wooden trays or on modern terraced concrete drying yards. Every morning after the dew has disappeared, the coffee is raked over to insure a thorough sunning.

After the coffee has been properly dried or "cured," it is repeatedly run through hulling and

fanning machines, which clean it and remove the tough hull. Then the coffee is ready for shipment.

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A coffee-drying plantation, Cordoba, Mexico. The berries are raked every morning in order to insure a thorough sunning

Why coffee is blended. Blending — usually done by the importer or wholesaler — is an important branch of the coffee industry. Different varieties of coffee beans are blended or mixed together in order to obtain a smooth, mellow, aromatic liquid. Blending strengthens a coffee that is too weak and

tempers one that is too strong. For instance, genuine Mocha is a little too acid and genuine Java is usually not quite acid enough to please the popular taste. So, in order that each element may be in just the right proportion to produce the finest possible flavor, the two coffees are blended. That is, the blender uses just the proper proportion of each to obtain the right result. The success of a certain

CHEMICAL COMPOSITION OF COFFEE[1]

	RAW COFFEE Per cent	ROASTED COFFEE Per cent
Caffeine	1	1
Sugar	9 to 10	½
Caffetannic acid	8 to 10	4 to 5
Fat and oil	11 to 13	13 to 14
Albumin	11 to 13	13 to 14
Nitrogenous extract and coloring matter	4 to 7	12 to 14
Dextrin	1	1
Cellulose (fiber), etc.	38	48
Ash	3 to 4	4 to 5
Moisture	8 to 10	1

[1]According to *The Grocers' Encyclopedia.*

brand of coffee depends largely upon the quality and uniformity of the blend. The blending of coffee is done before it has been roasted.

Roasting brings out flavor. Coffee roasting is an art which requires great skill, since it is proper roasting which gives the coffee its flavor. Of course different coffees from different countries will vary in strength and aroma or, as we sometimes say, bouquet, if subjected to the same roasting. However, a radical difference in roasting can bring about a far greater difference in taste than can nature through the influence of widely different soils and climates. The coffee bean is composed of innumerable tiny cells in which are stored the aromatic

Looking across a great coffee plantation from a train

oils of the coffee. Roasting causes certain chemical changes in the bean which alter both its appearance and its flavor. Roasting liberates the "caffeine," which is the stimulating quality in coffee, corresponding to the "theine" in tea.

When the coffee is ground the cells are broken up and the oils released. Then immersing it in boiling water quickly brings out the flavor. The art of producing the finest beverage from any coffee is much a matter of not permitting any of the aroma to escape from either the package or the brew.

Where we get our coffee. If coffee is not already the favorite drink of the American people, it is growing in popularity every day. On an average each man, woman, and child in this country consumes a pound of coffee every month in the year. In France coffee is served in several ways. Individually, Scandinavians are the world's greatest coffee drinkers. They drink coffee not only at each meal but also between meals.

Although the Netherlands proper produces no coffee, yet we have imported from this country almost 6,000,000 pounds in a single year. Can you explain this? If you can recall which country owns the rich East India islands, Sumatra and Java, your answer will be easy.

Brazil raises three fourths of the world's supply of coffee, producing more than 1,800,000,000 pounds in one year. Venezuela, with a yearly crop of 96,000,000 pounds, is the second largest producer, and Colombia, with 92,500,000 pounds to her credit, is the third. Guatemala grew about 89,000,000 pounds in one year and Mexico about 65,000,000 in the same period. These countries sold us about

the following quantities of coffee: Brazil, 743,000,000 pounds; Colombia, 91,000,000 pounds; Venezuela,

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Drying coffee in Sao Paulo, Brazil. As the method of curing and handling the beans greatly influences the flavor of coffee, this work must be done with care

50,000,000 pounds; Mexico, 49,500,000 pounds; and Guatemala, 25,000,000 pounds. Ask your family grocer about the average retail price of coffee in this country and with these figures you can make a very fair estimate of our national coffee bill. The sum will mount high into the millions, and will give you an idea of the tremendous importance of coffee among our foods.

How altitude influences coffee. "Coffee," says an expert who has many times visited all the great

coffee-growing centers, "is perhaps the most sensitive of foods. It is influenced by many things — by climate, soil, and method of cultivation, by the manner of picking, curing, handling, blending, roasting, grinding, and brewing it for the table.

"Perhaps the most noticeable feature in the raising of coffee is the great influence that altitude has upon the berry. The better grades of coffee, those grades that carry the exquisite flavor and strength of the best product, are raised in the highlands, while the less desirable grades are raised in the lowlands. The best coffee grows at an altitude of from 2,500 to 3,000 feet above sea level. The growth in the lowlands is ranker and the strength goes more into the foliage, while the hardy plants of the uplands put the snap and freshness of their crisp climate into the berries. Therefore we find the best coffee grown in Colombia — for the coffee lands of that country have the highest average altitude.

"The average coffee consumer, however, does not care to have a single grade of coffee served him, as it often proves to be too strong or too rich, too weak or too acid. That is why coffees grown in the lower altitudes are blended with those from the highlands.

Occupation descends from father to son. "Another interesting feature in the coffee industry is found in the fact that, like the making of cheese, the raising of coffee is an art that is handed down from father to son. There is this difference, however, that the sons usually go to America or to France to broaden their education. They go there to learn the most modern methods of financing their business, of marketing their product, and of meeting the varying requirements of foreign customers."

Chapter XXIV

TEA — THE WORLD'S SOCIAL DRINK

The symbol of hospitality. Tea is undoubtedly the most interesting of all our table drinks. Certainly it is more closely connected with social life than any other beverage we use. A cup of tea is the symbol of hospitality in the British Empire, China, Japan, Russia, and the United States. In England and America, at least, tea has lent its name to both a family meal and a formal social gathering. It is so securely grafted into the speech of the tea-drinking countries that children understand the social significance of tea serving before they are allowed to become familiar with the taste of tea itself. It is safe to say that, in any of the countries named, there are few little girls old enough to play by themselves with whom a make-believe "tea party" is not a favorite amusement.

While tea is distinctly the beverage of fashion, and may be said to typify the highest refinement of social life as it centers about the table, it also distills the "fragrance of hospitality" in cottage and in cabin. To brew a cup of tea for a caller is the nearest approach to a social function that the mistress of many a thatched cottage ever makes. There is scarcely a family in any English-speaking country, in Russia, or in any oriental land so poor that it cannot offer a "sup" of tea for the refreshment of the honored guest.

An inexpensive drink. Perhaps one reason for its popularity lies in the fact that tea is so inexpensive.

An American expert who has an almost world-wide reputation as an authority on tea declares that it is

Steaming tea in Japan. The first step in the sterilizing of tea

"the most inexpensive, the most sanitary, and, in the United States, the purest beverage to be had." Many people would say that it is also the most delicious. But that is a matter of individual taste.

This expert declares that from 250 to 300 cups of tea, of the proper strength to obtain the best "bouquet" or flavor, can be made from a pound of any tea of fair quality. Most of the well-known teas brew an average of 276 cups. In the United States, he estimates, the average retail price for tea is sixty cents a pound. Under these conditions the cost of a cup of tea would be a little more than a fifth of a cent.

His statement that tea is the most sanitary of table drinks is based on the fact that no tea reaches

The world's chief tea, coffee, and cocoa exporting and importing countries

the lips of the consumer until it has been thoroughly sterilized. It is first sterilized when steamed to prevent fermentation, again when fired in the drying process, and finally when boiling water is poured upon it to prepare it for serving.

Tea a good traveler. There is scarcely another thing served at our tables that can be more safely and conveniently shipped long distances than tea, for tea is a good traveler. When drinking a cup of black tea, did you ever ask yourself how far it had journeyed to meet your demand for a delicate, fragrant table drink? Let us suppose you live in about the center of our country, say in Omaha, Nebraska. If the tea served you is a black or mixed tea, it was undoubtedly taken first to England, where the greatest tea-importing houses are located. If this is true then it would go by way of Colombo, Ceylon, to Aden, Arabia; to Plymouth, England; to New York and thence to Omaha by rail, traveling about 10,900 miles. If the tea came by way of San Francisco it would leave Colombo, Ceylon, for Hong Kong, China; from Hong Kong it would journey to San Francisco and from there to Omaha by rail, a distance of about 11,100 miles. So, you see, tea from the port of Ceylon might be shipped into Omaha, either from the east or from the west, the difference between the two shipping routes being only about 200 miles.

We must bear in mind that foods do not travel "as the crow flies," but must take the routes selected by the navigators and the importers. Unlike the two routes to Omaha, sometimes the difference in the length of the journeys may be thousands instead of hundreds of miles.

Chinese tea traditions. Now let us consider tea in the light of its traditions, its history, and its sources of supply. The use of tea has been handed down to us from ages unknown. As in the case of coffee, there are various stories concerning its discovery. Among Chinese traditions is one telling how, in ancient times, tea was first steeped by Buddhist priests to alter the unpleasant taste of the brackish water they were obliged to drink.

Leaves, seeds, and flowers of the tea plant

Another tells how, almost three thousand years before Christ, Chin-Nung, a Chinese scholar and philosopher, learned the value of tea. Once, when putting a branch of the tea shrub on his fire he knocked some of the leaves into a pot of boiling water and accidentally "brewed" the first cup of tea. He found the drink so pleasing that he formed the habit of using it. He confided his discovery to his friends and their experiments with the leaf were so successful that its use very soon became common throughout the empire.

Spreading the use of tea. While some people claim that tea was first raised for commercial purposes in India or Japan, it is generally conceded that the tea industry began in China and was later established in other countries.

The Dutch East India Company introduced tea into the Netherlands early in the seventeenth century. It reached England as early as 1657 and was shipped by the English to the American colonies in 1680. At that time it was selling at five dollars a pound and upwards, according to the quality.

At first tea was not favorably received. Its use was condemned by writers, educators, and clergymen as a heathenish and immoral practice. In England especially the drinking of tea was bitterly attacked. In 1678, Mr. Henry Sevile, in writing to his uncle, names certain friends as among those "who call for tea, instead of pipes and bottles after dinner —a base, unworthy Indian practice which I must ever admire your most Christian family for not admitting." And he concludes, "the truth is, all nations are growing so wicked as to have some of these filthy customs." Members of the medical profession classed tea as a drug and placed it on a par with opium and morphine. Much of this censure no doubt arose because royalty frowned upon the beverage. However, there were men of distinction who defended the oriental table drink. The great Dr. Johnson was one of these early champions of tea.

In spite of all disapproval the use of tea grew with remarkable rapidity and seems never to have lost any ground once gained. The United States alone now uses about 100,000,000 pounds of tea a year. Of this our merchants import about 45 per cent from Japan, 25 per cent from China, and 15 per cent from England, which in turn imports it from Ceylon and British India.

Tea gardens and tea drinkers. Tea is produced in India, China, Ceylon, Japan, Taiwan (Formosa,

now a part of Japan), Java, Russia, and even to a limited extent in the United States. From our

Shipping tea. The tea is loaded into large scow-like boats which carry it out to ocean steamers bound for far-distant ports

government reports we learn that the world consumes more than 800,000,000 pounds of tea a year. This does not include the large amount used locally in the producing countries, figures for which cannot be secured. Of this 800,000,000 pounds more than 291,000,000 pounds are produced in India; over 200,000,000 pounds in Ceylon; about 200,000,000 pounds in China; 80,000,000 pounds in Japan and Taiwan; and 60,000,000 pounds in Java. The one tea garden of the United States, at Summerville, South Carolina, yields about 15,000 pounds a year.

Great Britain consumes more tea than any other country, using more than 300,000,000 pounds a year. Individually the British are the greatest tea drinkers, the yearly average for each person being about 7.5 pounds of tea. Russia also is a

large consumer of tea but is exceeded by both the Netherlands and the British colonies — Australia and Canada.

All teas belong to two general classes, green and black. These two classes really include three kinds of tea: the unfermented, or green tea, which comes from China, Japan, and — a small portion — from India and Ceylon; the oolong, from China and Taiwan, which is partly fermented before being fired; and the fermented, or black teas, which come from China, Ceylon, India, and Java. Originally there were many times as much green tea sold as black, but of late years the black teas of Ceylon and India are replacing the Chinese and Japanese green teas in almost every country. In England scarcely any green tea is sold, but here where black teas are most popular, each year the sales are becoming larger. As a result the tea industry in China is steadily diminishing, while in India and Ceylon it is increasing rapidly.

A visit to a Japanese tea garden. A tea garden is one of the most interesting places that the traveler in the Orient can visit. Let us imagine that we are walking through a tea garden near Kyoto, Japan. In the distance high, tree-clad hills stand out against the deep blue of the sky. A little closer extends a range of lower shaggy, bush-covered hills, and nestling at the foot of these is a cluster of quaint, odd-shaped little houses with roofs of tile. These are the factories and dwelling houses belonging to the tea gardens. In the foreground are acres of waist-high green bushes. Among these bushes are working scores of kimono-clad pickers. Each picker has a big light-weight basket. There are many children working among

the tea shrubs, for the picking of tea, in Japan, as in all oriental countries, is the task of women and

Picking tea in Japan. This work, which requires keen eyesight and nimble fingers, is nearly all done by women and children

children. They are very deft in this work, the principal requirements of which are quickness of eye and nimbleness of fingers. The skilled hands of the pickers skim over the bushes, hovering for an instant above a new "flush"—a bud and three or four tender leaves. With a single motion they pluck from it only the top two or three leaves.

It is almost impossible to realize how vital to the quality of tea is the selection of the time for picking. It requires an expert to decide when the leaves should be picked, and should his calculation prove wrong it would work serious injury to the entire harvest. If they are not picked at the proper time, the choicest leaves may deteriorate in a night

or two from the highest quality to an extremely inferior grade of tea.

The care with which these pickers work is surprising. The task of picking tea is an exacting one. The leaves must be nipped off cleanly, without bruising or breaking the stem or stalk. These Japanese pickers receive from ten to fifteen cents a day, according to their skill. To us this seems a very small wage, until we remember that ten cents will buy far more in the Orient than in America. The negro children who pick tea in the gardens at Summerville are paid about twenty-five cents a day.

The Emperor's garden. A special tea is grown under cover for the Emperor of Japan. The tea garden is screened to shut off the sunlight from the plants. This makes the leaves very silky and larger in average size than other leaves. Tea grown in such a manner would naturally be very expensive.

Difference between green and black tea. The same kind of tea leaf can be used for the manufacture of either green or black tea, the difference in the two teas lying merely in the process of curing. At present little black tea is produced in Japan, but experiments looking to its production there are now being carried on.

In producing green tea the leaf is sterilized by steam. This prevents oxidizing or fermentation of the leaf, which retains its green color, and when boiling water is poured over it the result is a green or greenish-yellow liquid. In manufacturing black tea the leaf is allowed to ferment, which changes its color from green to very dark brown. In the case of oolong, or semi-fermented tea, the fermentation is allowed to reach a certain desired point.

Curing green tea. In the tea garden near Kyoto, we should find the natives curing green tea. After

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Spreading the tea leaves in the drying house. The method of drying the tea leaves with hot air is now very generally displacing that of sun drying

it is picked, the first step in the manufacture of tea is the steaming. While in China large quantities of tea are still sun-dried in shallow bamboo trays, in Japan more modern methods are employed for drying tea. There it is done almost wholly by hot air in neat drying houses especially designed for this purpose.

The next step is firing. In Japan, the tea is placed in large shallow pans over charcoal furnaces, where it is kept in motion by constant stirring. In China the tea is put into large metal bowls, under which burn charcoal fires, and is kept in motion until properly fired.

As it is being fired, the tea is also curled — either by machinery or by being rolled between the palms of the curlers' hands. All this is done by the grower, who ships the tea to a central market where the factory fires it again to arrest fermentation and to fix the green color. Then the tea is ready for export. If the leaves are not thoroughly dried they are inclined to ferment and turn black. In a long, shedlike room are great piles of cured tea leaves, which are screened through various sieves and in this way cleaned and sorted according to grades.

In China and Japan almost the entire work of picking, curing, and sorting tea is done by hand. In China much of the hand work in tea curing is unnecessary and in spite of the low wages paid the laborers could be done better and perhaps more cheaply by machinery. But in Ceylon and India — although there, too, labor can be had for a few cents a day — the British have installed machines for the greater part of this work. Consequently if we were to visit a large Ceylon tea garden we should find conditions quite different, at least as far as curing the leaf is concerned. Such a garden and its factories would probably be owned and operated by a large English corporation.

Learning tea culture secrets. For many years the Chinese carefully guarded the secret of tea cultivation, hoping that by so doing they could retain the world's trade. They contended that it would not be possible to grow tea successfully in any other country. Finally some English horticulturists discovered wild tea shrubs in Assam, India. This convinced them that tea could be successfully grown

there, and they began the study of tea culture. Then certain adventurous Englishmen went to China, braving many dangers, and finally succeeded in dispelling the mystery which the Chinese had woven about the culture of tea.

They learned that, while tea was a hardy plant that would grow in poor and sandy soil, its quality

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In Japan the dried tea leaves are sifted through screens of different sizes to clean and sort them according to grade

was greatly influenced by soil and weather conditions. They learned, too, that while it could be

grown in a dry climate, when the rainfall came with reasonable regularity the plants put forth more

Transplanting tea. The seedlings grown under shade in nurseries are planted out in the gardens when about six or eight inches high

new shoots and the leaves were richer in flavor and more elastic. They also learned that the soil had a great deal to do with the size and yield of the shrub and that the location of the plantation or garden counted for much. Further search showed that, in spite of general reports to the contrary, the Chinese did fertilize their gardens and fertilize them generously.

Establishing tea culture in India. History tells us that in the year 1832 the governor-general of India appointed a committee to introduce the culture of tea into India. This was one of the most important events in the history of modern India. An official was sent to China to procure seed, and skilled

Chinese workmen to establish plantations in the Himalayan regions. Then the East India Company began many experiments in tea culture. In the year 1836 one pound of tea was sent from Assam to London, in the following year five pounds more were sent, and in 1839 ninety-five boxes. In January, 1840, the Assam Company was formed and from that time on the cultivation of tea in India was a private industry.

A failure and a success. After 1840 both the English and Dutch attempted to introduce tea into Ceylon. They were unsuccessful until the year 1876, when the failure of the coffee crop compelled the planters to turn their attention to tea. Since that time the tea industry has made wonderful strides in Ceylon. In fact, Ceylon tea has done quite as much to make that island famous as have its spices and coffee.

Experiments in other lands. Our own government also has experimented with the cultivation of tea, and in 1880 sent to India and secured a planter of fourteen years' experience to take charge of its experimental work. More recently the Department of Agriculture has co-operated with Dr. Charles U. Shepard, a private citizen who has a small tea garden near Summerville. This garden contains about sixty acres. Dr. Shepard started his Pinehurst Tea Garden or plantation in 1890 and has proved that tea can be grown successfully in our own Southern States. The present yield is about 15,000 pounds a year. It seems unlikely that much progress will be made in tea growing on a commercial scale here because of the relatively high cost of labor.

Successful experiments in tea culture have also

been carried on in Brazil, in Australia, and in Natal, South Africa.

Two practices in tea picking. Owing to distinct climatic differences, the calendar of tea picking in Ceylon differs from that in China and Japan. Tea is picked only three times a year in China and Japan, while in India, Ceylon, and Java it is picked every seven to ten days, throughout the season. Under this practice the bushes are gone over about twenty times as against three times in Japan and China. The bushes in Ceylon have to be pruned back and rested about every fourth year as an equivalent of the winter rest which the bushes get in northern tea-growing countries.

A Ceylon tea garden. In Ceylon the pickers are dark-skinned Tamil coolies brought over from India. They are usually clad in two pieces of bright cloth, one for the waist and the other for the skirt. With every crew of pickers one will see a partially clothed *cangany*, or taskmaster, who invariably carries a gay-colored parasol.

Now suppose we visit a Ceylon garden and see how it differs from the Japanese garden. At first glance we notice that the garden is situated on three sandy hills, between which the river winds and twists. At the extreme south is a stone power plant perched on the bank of the river. This plant furnishes electricity to the modern buildings in the garden. Beyond we see the bright dresses of the pickers as they move slowly to and fro among the green shrubs of the garden, while a vivid sunshade bobbing up here and there discloses the presence of the ever-watchful *cangany*.

If you were walking through this garden, quite

likely you would see many of the slender, dark-skinned, black-haired Tamil women pickers tightly

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Picking tea in a Ceylon tea garden. A bright sunshade discloses the presence of the cangany, or overseer

wrapped in enormous lengths of cotton cloth of various shades and patterns. No doubt they would be highly decked out with brass jewelry. By means of a cord passed over the head they carry on their backs large cane baskets. This manner of carrying the basket permits the free use of both hands for picking. Each basket holds fourteen pounds of tea, and a coolie is expected to pick three baskets of tea leaves a day.

Curing black tea. The first step in the manufacture of black tea is the withering. This is done in a large, light, airy, clean room, down the center of which extend two rows of adjustable frames or

racks. In these racks are innumerable shelves with jute-Hessian or wire bottoms, upon which have been lightly scattered freshly picked tea leaves from thousands of baskets. Here the leaves are left to wither for eighteen to twenty hours, in order to allow the sap and other moisture to evaporate. Then begins the second process of manufacture — "rolling" or curling.

One can almost step from the door of the withering house to that of the rolling house. This house contains five rollers; beside each roller, on a small square box, stands a native clad only in a white cloth wrapped about his loins. The leaves are put through the rotary rollers to give them a good

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Ceylon natives sorting tea. A Ceylon tea picker is expected to gather three basketfuls, or forty-two pounds, of tea leaves a day

twist. Here may be seen a large motor driving many modern machines. The rolling room is

whitewashed throughout and, like all the other buildings, lighted by electricity.

Fermenting is the third process in the production of black tea. The rolled leaves are spread on the floor and covered with wet cloths. Here they are allowed to remain until they turn a bright coppery color.

The next step is the firing. In the firing room may be seen a number of odd oven-shaped machines. Before each machine stands a half-naked attendant, and hurrying from machine to machine is a white man, dressed like a chef. A number of barefoot natives, each carrying a wire tray filled with tea leaves, glide noiselessly across the stone floor. The trays are quickly slipped into the machines, or

Sorting tea by mechanical sifters into grades and qualities known as pekoe, orange pekoe, pekoe souchong, and souchong

furnace, and the heavy door closed. A current of hot air is passed through the machines to dry the tea.

When the tea is removed it is brittle and black. It is now ready for the final process of sifting. There are a number of different kinds of sifters, all driven by electric power. The largest is something like our old-style grain separators, and consists of a half dozen vibrating trays, each fitted with a screen having a different mesh. The different grades of tea run from the separator through various short spouts into boxes which are removed by workmen as fast as they are filled. Here are sorted all the commercial grades of tea known as "broken orange pekoe," "orange pekoe," "pekoe," "pekoe souchong," "souchong," "fannings," and "dust."

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Russian tea drinkers

"Russian tea." We hear much of Russian tea; but there is only one real Russian tea and that comes from the Imperial Domains estates at Chakva, near Batum. The original plants on these estates were brought from China. Although Russia is a large consumer of tea, only a very small portion of its supply is raised at home. The term "Russian tea," as commonly used, refers to a black tea served as the Russians serve it, and not to tea grown in Russia.

How the government protects the consumer. Considerable adulteration is practiced in the tea

industry of the Orient. The cheap grades of tea used in China and also in Europe are colored with Prussian blue, gypsum, soapstone, turmeric, and other coloring matter. Tea exporters have even resorted to the use of paraffin to preserve the tea. The United States government does not allow such tea to enter this country for sale. As early as 1883, the United States passed a law governing the sale of tea and in 1897 this law was perfected.

The quality and grades of teas that may be imported into this country are determined by a board of seven tea experts. They select certain teas to be used as standards with which all imported teas must be compared. As the supervising tea expert puts it: "The government officially furnishes the 'yardstick' with which the quality and fitness for consumption of all teas imported into the United States are measured."

These standards, or "measuring sticks," consist of half-pound packages of tea conforming exactly to the requirements of the law. They are sent to every United States tea examiner and are also distributed to American tea importers. The importers send them to their buyers in the Far East, so that they may purchase only the teas that conform to the official standards. In this way the public is carefully protected against inferior teas.

No artificially colored tea is allowed to come into this country for sale. A simple and effective test, known as the Read test, is used to determine whether or not artificial coloring has been added to tea. This test was discovered by a woman, Dr. Alberta Read. The specification for this test says that a certain quantity of the dust of the tea under

examination shall be sifted upon a semi-glazed white paper and crushed with a steel spatula. The dust shall then be brushed off and the paper examined with a magnifying glass for streaks of coloring matter. If, in the opinion of the examiner, the tea under test contains coloring matter, the test paper, as well as a sample of the tea itself, is sent to a chemist for analysis. Artificially colored teas were freely imported into this country until our government established this board of tea experts. The Read test used with black paper will detect the "facings"—or foreign matter used to improve the appearance—such as talc, gypsum, barium, sulphate, and clay, which are sometimes used with green tea.

Tea is also tested for its flavor or "bouquet." One test for strength and flavor is known as the cup test. This test consists of drawing and brewing a quantity of tea equal in weight to a silver half dime, and comparing it with the same quantity of the standard or "measuring stick" tea, which it must equal as to bouquet, body, taste, and appearance of the leaf that has been infused.

If an imported tea falls short of the standard in a single respect, that is sufficient cause for its rejection. When a tea is condemned by an examiner it cannot be released from the bonded warehouse, where all teas must go on entering this country. If condemned tea is released it is in order that it may be immediately sent back home or destroyed. Our government takes these steps to prevent its sale in this country. Poor grades of tea are used chiefly in Asia and Europe. But not a pound can be sold in the United States. Every shipment of

tea which is allowed to leave the bonded warehouses has been favorably compared with the

Packing tea in Ceylon. Laws made by the United States government regarding teas imported into this country have raised the standard of teas and brought about many improvements in the handling of tea in the Orient

official standards. In other words, our country gets the cleanest and purest teas of any country in the world, because our laws, as enforced, will admit no others.

Inspection by the United States government has notably raised the standard of the teas imported into this country. More than this, it has had a wholesome effect in the Orient. When the big growers found that certain reforms in handling and preparing their teas were necessary in order to make their product meet official standards in the United States, naturally the improvement also affected teas going to other countries. It is gratifying to know that

in much the same way the United States is raising the standards of wholesomeness and cleanliness of many other foods grown and prepared in foreign lands.

Brewing tea the government way. Among other things, the government has determined just the proper length of time to brew tea, and why. On an average, a three-minute infusion in boiling water has been found to produce the best results. This is because in that length of time most of the theine — the desirable element — which lies in the skin or outer part of the leaf, is extracted, and very little of the tannin — an undesirable element found in the inner tissue of the leaf — is drawn out by the brew.

Teas cured and prepared where grown. Except that much mixing or blending is done in the great tea-exporting houses of England, all the curing and preparing of teas takes place in the countries where they are grown. Tea is delivered to the American consumer just as it is shipped from the tea gardens, except that it is repacked in convenient, sanitary, flavor-retaining tins and boxes. This brings the teas to the home in packages containing from a quarter of a pound to five pounds, and assures the housewife that she is receiving a product of uniform quality and blend.

Chapter XXV

TABLE DRINKS

Cocoa, a popular drink. One of the most delicious of all table drinks, cocoa—a favorite with children in every part of the world, especially in Europe—has a history that reaches back to the Spanish conquest of Mexico and contains many dark and forbidding chapters. Not even the spice trade of the South Seas has a wilder background of romance, adventure, and sacrifice of human life than has the cocoa traffic.

Long before Columbus discovered this continent the natives of Mexico and Peru were enjoying the delicious and wholesome beverage made from the cocoa bean. The Spanish conquerors of Mexico, who followed Columbus, found the natives cultivating extensive plantations of cocoa. Tradition tells us the emperor Montezuma was a lover of cocoa and consumed many jars of the drink each day. There can be no question that it was highly appreciated by the ancient semi-civilized races that flourished in Central America.

Christopher Columbus is said to have been the first to bring a knowledge of this remarkable article of food to Europe. But it was not until later that the use of cocoa became a common custom in Spain and Portugal. It was introduced by the Castilians (Spaniards) into many other countries. But because of Spain's monopoly of the cocoa industry the price demanded when it was first introduced into England was so high that only the very rich could afford it.

Cocoa is at once a food and a drink, its popularity being indicated by the variety of its uses. Cocoa,

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Natives gathering cocoa pods. Note the curious way in which the pods grow on the bare trunk and larger branches of the tree

or chocolate, is used at the soda fountain, as a candy, as a drink, as a flavoring, for cooking and baking purposes, and, finally, as a condensed food.

The real name of this popular food is "cacao," the term "cocoa," now so commonly used, being a corruption of the correct name. Usage, however, has established the practice of applying the term "cacao" to the tree and to the unbroken fruit, while the bean, whether whole or crushed, is called cocoa.

Chocolate is so much more generally used than commercial cocoa that the distinction between these two forms of the same food is not understood by most

consumers. Both are prepared from the bean of the cacao tree, but chocolate is made from the meal of the bean after it has been roasted and ground, before its rich oils are extracted. It is almost always sold in cake form and may be bought plain, sweetened, or flavored, according to the purpose for which it is to be used.

Cocoa is the powdered form of the crushed, roasted cocoa bean, from which most of the heavy oil found in chocolate has been extracted. As a table drink for the home this is undoubtedly the most popular preparation made from the fruit of the cacao tree.

Some people, however, prefer to have their breakfast drink made from what is called cocoa nibs or cracked beans because the latter contain more oil than ordinary cocoa. Although these are cheaper, it requires more time and it is more trouble to make a drink from them than from ground cocoa.

As bran is removed from the wheat kernel, so the shell or husk is taken from the cocoa bean. Many persons of delicate digestion find wheat bran a food that they can easily assimilate. So, too, many who find cocoa or chocolate a little heavy for their use, brew a light but delicious drink from the cocoa shells. The shells are very cheap and are sometimes used as food for cattle.

Cocoa is grown in many countries, among which are the British Gold Coast colony, Africa, Ecuador, Brazil, Ceylon, Java, the Portuguese colony of St. Thomas, Venezuela, Trinidad, Santo Domingo, and practically all the other islands of the West Indies.

It is estimated that early in the nineteenth century about 23,000,000 pounds of cocoa were consumed each year, one third of which was used in Spain.

The annual consumption of cocoa in Europe at the present time is about 225,000,000 pounds.

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Cocoa pods and beans. The great pods are from seven to twelve inches long and contain from twenty-five to fifty beans about the size of almonds

The United States uses about 140,000,000 pounds of cocoa in a normal year, being the largest cocoa-consuming country in the world.

How the cocoa beans grow. The cocoa beans or seeds grow in large pods, of varying shapes and sizes, averaging about nine inches in length and four inches in diameter at the thickest part. These pods somewhat resemble one of our long, deeply ribbed cantaloupes. They have hard, leathery rinds of a dark yellow or yellowish-brown color, which inclose a mass of pink pulp in which the beans are embedded. Each pod contains from twenty-five to fifty beans. The beans are about the size of an ordinary almond. When fresh they are white and have a decidedly bitter and disagreeable flavor. After the beans are dried they turn a reddish brown.

The cacao tree bears its fruit in an odd and interesting way. The pods grow directly out of the

Removing the cocoa beans from the pods Brown Bros.

bare trunk and larger branches of the tree, and not on the younger branches among the foliage, as do other fruits.

The cacao pickers or gatherers are armed with long bamboo poles, at the end of which are fastened big, odd-shaped blades. Only the ripe pods are cut, and as their stems are very tough, it requires a strong, well-aimed blow to sever them. The gatherers must have more than ordinary physical strength and endurance, for the knife poles are sometimes thirty feet long and are extremely awkward to handle.

As fast as the pods are brought down by the knife-men, they are piled in heaps. The following day, usually, the pods are cut open with a very

sharp knife, a process which requires great care to avoid injuring the beans. After the beans are hulled they are carried in baskets to the curing station. Here the acid juice is drained off and the beans placed in fermenting boxes, where they are allowed to remain for some time. Another method of fermentation, known as "claying," is extremely interesting.

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Curing cocoa on an Ecuador plantation. Enough cocoa beans are in sight in the drying yard to make more than two hundred thousand pounds of chocolate

The beans are put into holes in the ground and covered with clay. Under this method, however,

there is always danger that the beans will ferment too rapidly. Only experts are able to handle them by this process without great loss. The beans are fermented in order to enable them to absorb certain properties of the pulp. If fermentation is not successful the bean are considered improperly cured and are sold as a second-grade product. Well-fermented beans are of a rich, reddish-brown color.

Drying the beans. Following fermentation the beans are placed on broad cement or bamboo floors and allowed to dry in the sun. In some parts of South America, in the cleared center of a plantation, which is really a tropical forest, one may see immense floors of this sort, evenly strewn with drying beans. After the beans are dried they are put into bags and sent to the various markets as crude cocoa.

At the cocoa factory. At the cocoa and chocolate manufacturing plants the beans are first cleaned and sorted and then roasted. As with coffee, the roasting of the cocoa bean has much to do with its flavor. Too little roasting leaves the beans heavy and flavorless, while too much roasting turns them bitter. The roasting machine keeps the beans in constant motion while they are being fired. This operation usually requires about thirty-five minutes.

After they have been roasted the beans are passed to a machine that cracks the shells and breaks the beans into small fragments. These are next put through a fanner which separates the hull from the broken bean. Then comes the grinder in which the cracked beans are ground to a soft, oily mass, from which part of the oil is pressed in the making of powdered cocoa. Monster steel mills have replaced the shallow stones that were used to

crush the cocoa bean at the time of the Spanish Conquest. Cocoa, like coffee, is blended and for the

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A busy day in a cocoa factory. Cleaning and sorting cocoa beans for the roasting machines

same reason: to obtain a combination which will give the finest flavor and aroma.

Cocoa beans as money. In the early days in the tropics cocoa beans were used, to some extent, as a standard of value in place of money. We are told that this primitive kind of coin is still current in an isolated part of Southern Mexico. A common expression for cheap articles in the market is that so many sell for a "cinco." This, it is said, originally meant five cocoa beans; but in order to allow for the fluctuating value of the bean, a "cinco" usually consists of from two to five cocoa beans. The money value of a "cinco" is about one half cent, Mexican.

Food value of cocoa. Scientists and medical writers have much to say regarding the food value of cocoa. They tell us it is highly nourishing and easily digested; that it repairs wasted strength quickly; and that it is uncommonly wholesome. In Central America, when expeditions are organized to traverse the forest and swamps and follow rivers into the heart of the jungles, it is usual to include in their rather scanty commissary a generous supply of chocolate, consisting of about 80 per cent cocoa and 20 per cent coarse sugar. The food value of this is about as follows:

Sugar	20 per cent
Fat	41 per cent
Albumen	10 per cent
Phosphates and salts	3 per cent
Other matter	26 per cent

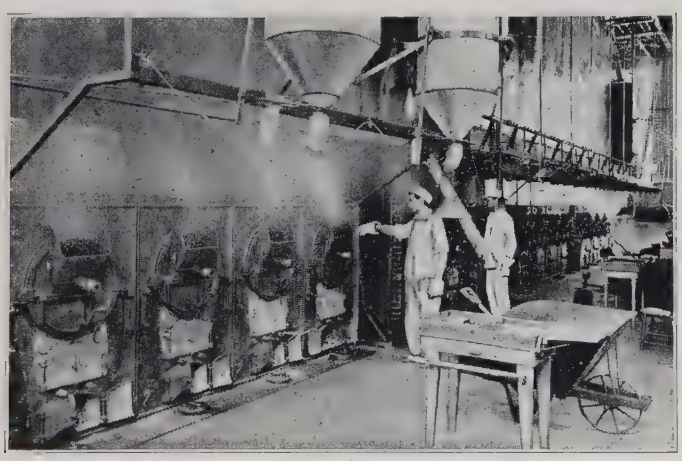
Cocoa in some of its forms is used by several South American nations as a solid food much as we use bread and meat, and not at all as a dainty or a confection.

Other beverages. Although the people of the United States consume about 1,000,000,000 pounds of coffee a year, 140,000,000 pounds of cocoa, and 100,000,000 pounds of tea, that immense total is not enough, either in volume or in variety, to meet the American demand for a breakfast beverage.

In addition to the products of the tea gardens of the Far East and the coffee and cocoa plantations of the tropics, we must look to our own grain fields to furnish still further variety in the way of table drinks.

Practically all our grains are used for this purpose. In varying quantities we find wheat, rye, rice, barley, corn, and malt used in this way. With

some of these grains molasses, coffee, chicory, peas, and peanuts are combined in order to obtain the



Roasting grains in a factory which turns out one of our most popular table drinks

desired flavor. The value of these various substitute drinks depends, of course, upon the percentage of the grains or other substances used. It is true that they do not contain the stimulative properties of tea, coffee, and cocoa, but they have an aroma and a pleasant flavor of their own and are agreeable and wholesome. For these reasons they are acceptable to a considerable number of American people and the number of their users is undoubtedly increasing.

Grape juice is another drink that has won popular favor in this country. It is pure fruit juice, extracted from ripe grapes and sterilized to prevent fermentation. The people of the United States drink about 5,000,000 gallons of grape juice a year.

Chapter XXVI

NUTS

Nuts as a food. There is hardly an American boy or girl living in the country to-day or a man or woman whose childhood was spent there who does not think of "going nutting" as one of the pleasantest of all country pastimes. But of the many people who treasure memories of the fun they have had gathering nuts few ever think of nuts as a "real food," as having any real part to play in the food supply of this nation. The people of the United States — and especially our country people — have come to think of nuts almost wholly as a dainty, something to be eaten for their delicious taste and not as substantial food.

Piecing out the pioneer larder. The early settlers in the wooded sections of the United States were often forced to eat nuts, not as a delicacy to be nibbled daintily, but as a means of supporting life until they could raise a supply of grains, vegetables, and fruits. In nearly every part of the timber country, nut trees grew wild and nuts could be had abundantly merely for the gathering. Many pioneers would have had much less to eat and some of them would have perished without the wild nuts only waiting to be harvested. For this reason the early settlers knew, better than the people of to-day, how useful nuts are and how they may be made to help out in the family living. Undoubtedly these settlers would have made greater use of this food, had they understood what the experts in nutrition

have long since found out. That is, that nuts are about the richest food nature has prepared for our use. Nuts, as a rule, contain more protein, fats, and heat-making material, pound for pound, than meat, eggs, wheat, or even cheese.

As an everyday food, not a luxury. This is only another way of saying that nuts are among the most nutritious of our neglected foods. As their great food value becomes better appreciated and the pleasing ways in which they may be combined with other foods become more generally understood, nuts will become a most important article of our trade. That the use of nuts as a food is steadily on the increase in the United States may be seen by their increased sales. Nuts are a wholesome food and in time will no doubt rank as a food necessity and not as a luxury. This means that great quantities of wild nuts which have been allowed to fall and remain unharvested will be gathered, sold, and eaten. This yearly waste is now so large that if we were able to express it in definite figures we would all be astonished. Just because the United States is not as thickly populated as the Old World countries and because it is remarkably fruitful is

The pecan

no excuse for our wasting or neglecting so valuable an article of food—a food, too, that nature furnishes as lavishly as she does nuts.

The wide distribution of nuts. The fact that many nuts, with ordinary care, will keep in good condition for many months is decidedly fortunate. Still another advantage they possess is the generous way in which they are distributed over the whole country. It is an uncommonly barren and almost treeless region that does not offer us some kind of nut that is rich, meaty, and wholesome. If you look from the window of a transcontinental train upon a stretch of stunted piñon trees in the Southwest, you feel sure that nothing in sight could possibly yield food. Yet these low, scrubby piñon trees produce great quantities of finely flavored nuts. Piñon nuts are highly prized by those who are familiar with them and are aware of their nourishing qualities.

While some nuts are not found outside a limited territory, there are others which are found almost everywhere. For instance, the black walnut is scattered from the Atlantic to the Pacific coast and from the Canadian border far into the South. The hickory nut and the chestnut also extend over a wide range. On the other hand, the hazelnut and the piñon nut are not nearly so widely distributed. You will find it interesting to see how large a list you can make of nuts to be found in your own locality. Perhaps the extent of that list will surprise you.

Cultivation: improves quality, increases use. The broader appreciation of the food value of nuts and an increased use mean that their production

will not be left entirely to the chances of natural seeding and wild growth, but will depend more

Shelling and grading English walnuts. Scientific cultivation and handling have greatly extended the use of nuts

upon planting and careful cultivation. This has been the history of almost every fruit and vegetable that has gained popularity enough to become a leading article of trade. Usually cultivation has greatly improved the quality of a fruit, increased the quantity and the certainty of its yield, and sometimes brought it into earlier bearing. Then, too, the experts who make a careful study of a fruit are usually able to change it so as to remove faults that would interfere with its commercial success, developing in their place more pleasing and desirable qualities. The "paper-shelled" walnuts, pecans, and almonds are fine examples of what they have done in the way of improving nuts. Here the skill of scientific growers has reduced the thickness of the shell so that the nuts may be easily cracked. They

saw that a thin, brittle shell which could be easily cracked at the table would add immensely to the

An English walnut orchard in New York. A hardy variety of this nut thrives even in localities where the winters are more severe than in western New York

popularity and sale of these nuts. At the same time they realized that great care must be taken to secure this advantage without sacrificing the sweetness and the characteristic flavor of the nuts. Possibly there has been a slight loss in flavor, but the shells have been so altered in thickness that they well deserve the name "paper." It is equally true that this alteration has secured English walnuts, pecans, and almonds an undisputed place at the social table, thereby greatly extending their use and increasing their market value.

There are few kinds of specialized farming more interesting and profitable than nut culture. This industry has been best developed in the South and

the Far West. Here are found vast fields of peanuts and orchards of pecans and groves of almonds and English walnuts. The region of western New York, near Lake Ontario, also has highly developed English walnut orchards. The nuts from these orchards are of a particularly sweet and hardy variety which thrives in localities where the winters are even more severe than in western New York. Thus we see how the increased demand for these fancy nuts has brought about an astonishing increase in the area of their production.

Our nut supply and its sources. Because of the immense supply of wild nuts gathered and eaten without ever being marketed, it is impossible to form any idea of the quantity of nuts consumed by the American people. With cultivated nuts it is possible to be more definite. In a single year we exported to other countries about 8,000,000 pounds of peanuts and about $400,000 worth of other nuts.

In spite of the millions of pounds of nuts grown in this country, we bought from other countries about 190,000,000 pounds of nuts in a single year. We imported about 18,000,000 pounds of almonds, 50,000,000 pounds of coconut meat, 20,000,000 pounds of Brazil nuts, 12,000,000 pounds of filberts, 44,000,000 pounds of peanuts, and 37,000,000 pounds of walnuts in twelve months' time. We also bought more than $1,000,000 worth of other nuts.

There are, perhaps, no countries in the world, except those lying within the polar regions, that do not send us some kind of nuts. The geographic range of our nut supply extends practically over the entire world. We buy nuts from Europe, from Asia, from Africa, from Central America, South

America, North America, from the East Indies, the West Indies, from the islands of the Far South, and

Harvest time in a California almond orchard. The almond, a native of Africa and the Far East, is a great success in California

from the islands that dot the wide expanse of the Pacific Ocean. Perhaps a glance at the various nuts and their native homes will teach us something of the geography of this wonderful food.

Nuts of many kinds. Our most common native nuts are: the acorn, hickory nut, chestnut, black walnut, and butternut. We also grow great quantities of peanuts, almonds, pecans, and English walnuts.

Let us study the geography of our imported nuts. The pistachio, a small bean-shaped nut of green color and peculiar flavor that you have undoubtedly eaten in ice cream or candy, is a native of Western Asia. We still import our chief supply of it from that region. This nut commands an unusually high price, and as it can be grown in the United States it is not to be wondered that enterprising Americans

have begun to cultivate it. There are now pistachio groves in California.

The English walnut is native to England, Austria, and Germany. We import walnuts from France, England, Germany, Italy, Chile, Turkey, and Australia.

The litchi nut is really not a nut at all, but a dried fruit with a flavor something like that of the raisin. The litchi is a great favorite in China and we import many thousand pounds for the use of the Chinese here. Another Chinese dainty is the ginkgo nut, which grows in that country on what we call the maidenhair tree. It is eaten here only by Orientals.

The pignolia, or pine nuts, which grow on many varieties of pines, both here and abroad, were the chief food of some tribes of American Indians before our forefathers settled in this country. They have also been used as food in Italy and in some Asiatic countries for a great many years. In our own Western States they are known as "piñons." We import these nuts chiefly from France and Italy.

The water chestnut—the seed of a water plant—is used extensively in Asia. In this country it is eaten almost entirely by the Chinese who live here and for whom we import it from China.

We are now buying in small quantities from South America what is known as the paradise nut. It resembles a Brazil nut in shape but by many it is considered a little finer in flavor.

There is an interesting story told about this nut, which grows in a large round pod with a small cap at one end. As the story goes, the gas which forms in the pod after it has fallen to the ground forces the cap out with a loud report. This report attracts the

monkeys, who then search for the nuts in the thick undergrowth, where they have been blown by the force of the explosion. This is given as the chief reason for the small supply of paradise nuts brought to our markets.

Another tropical nut is the cashew, which you perhaps have tasted. There is a candy made of cashew nuts that can be bought in some of the finest delicatessens and candy shops in our country. Like the candle nut, which also grows in the tropics, the cashew nut should be roasted before being eaten, as it contains poisonous elements which are destroyed by the heat. This nut, however, can be eaten raw

Taking on a cargo of Brazil nuts for the New York market. The United States buys more than twenty million pounds of these nuts each year

or pickled when properly shelled and prepared by one familiar with its peculiarities. But should you

or I attempt to eat one, as we would a walnut or pecan, we would very likely suffer for our rashness.

Like the peanut, the tabebuia nut from Zanzibar is roasted. The tabebuia is the seed of a fruit which looks much like a pumpkin, and so perhaps we should not class it as a nut, but as a seed.

The Brazil nut, of which we import 20,000,000 pounds a year, is a native of Brazil and Guiana and is of special interest because of the way it grows. Large hard, round shells, some of them twice as big as an ordinary coconut, encase two dozen or more of the popular Brazil nuts—or cream or Pará nuts, as they are often called. These great round nut cases grow on very large trees. Because of their weight and their hard shell it is dangerous for any one to venture among the trees when the nuts are ripe enough to fall.

"Earth nuts": the peanut and chufa. There is scarcely a boy or girl in America who is not familiar with the peanut. Strictly speaking, the peanut is not a nut but a pod seed—a true legume and first cousin to the pea and bean. It is a native of Brazil, but is now cultivated in all warm countries. The United States produces about 300,000,000 pounds a year, and Africa, Spain, China, Japan, Italy, Java, and France together grow about twice that quantity each year.

The peanut does not grow on a shrub or tree, but on a vine. As the blossoms appear they are covered with earth and the nut develops in the ground, somewhat like potatoes. Unlike the potato, however, the nut is attached to the branch and not to the root of the vine. Commercially the peanut is grown not only for the whole nut but also for the

manufacturing of peanut meal, peanut butter, and peanut oil.

Another odd underground or earth nut is the chufa, which is known also as the earth almond. The plant is a sedge or grass and, unlike the peanut, the nuts grow on the roots, like the potato. The chufa is eaten both fresh and dried and is a very common food in Southern Europe.

Coconuts. The coconut palm may be found on almost any of the islands that dot the surface of the Pacific Ocean. There is an interesting story about the way in which many coconuts are planted.

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A group of coconut palms, Jamaica. The coconut palm flourishes throughout the West Indies

Every year thousands of coconuts are blown from the trees into the water where they drift about until

they are cast upon some friendly shore, there perhaps to take root and establish another grove. In this fashion practically every island of the Pacific that is not sheer rock has been planted with coconut palms.

The coconut has been transplanted to many other tropical regions of the globe and now there are great groves of coconut palms in the West Indies, in Ceylon, and in India.

Like the reindeer of Alaska, the coconut palm furnishes the natives dependent upon it with food, clothing, shelter, boat-making materials, and many other necessary things.

The coconut palm has a long, slender trunk with neither leaf nor limb, except at the top, which has a "crown" of immense leaves and clusters of nuts. These nuts are covered with a thick, tough green husk. The nut itself has a hard, hairy shell, inside of which is a rind of white "meat" and as much as a cupful of "milk." This milk is decidedly agreeable to the taste and very refreshing.

There are two ways of harvesting coconuts. One is to have native pickers "walk" up the tree and pick them, and the other is to cut them with long-handled cutters. The former method is extremely picturesque. Clutching the trunk of the tree firmly with his hands, the native places his bare feet on its ribbed bark and, using both feet and hands to propel himself, clambers quickly to the top.

When the coconuts are very ripe they will fall of their own weight. After they have been gathered from the trees and the ground, they are heaped into immense piles, close to water when possible. The husks are gashed with a knife or spike and a thin

strip of the fibrous covering torn partly off. Then they are tied in pairs and tossed into the water by

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A coconut raft on its way to market. One of the most curious and interesting ways of transporting food products

the natives, who bind them into a continuous chain with cord made from the fiber of the coconut palm. These coconut chains are then formed into rafts and floated to market, or to some shipping point. Coconut rafts are usually propelled by long poles with which the natives "pole" their harvest to its destination. During harvest the waters bordering the coconut groves are crowded with acres of these curious rafts.

When the coconuts reach the market, expert workmen remove the husks. The coconuts are then sold, either to shippers who send them to all parts of the world, or to shredding factories, oil factories, or butter factories. In the shredding factories the coconut is shelled, dried, and shredded, then put in packages, or shipped in bulk to other plants where it is placed in containers to be used in cakes and candies. The commercial name for the dried coconut meat from which oil is pressed is "copra." In the United States alone 70,000,000 pounds of shredded coconut have been used in a single year. In addition to this we import annually almost 100,000,000 whole coconuts.

In other factories the meat of the coconut is made into oil and butter and exported to all parts of the world. The shells of the coconut are used for many purposes, notably ornaments and gourds.

Nutritious nut products. A number of different products are made from nuts, the most common, perhaps, being nut butters. No doubt we have all tasted peanut butter. There are many factories in the United States where thousands of pounds of it are turned out every day. It is really a very simple thing to make. The nuts are first shelled, then roasted, cleaned of chaff, carefully sorted, and finally ground into a soft, oily paste, to which salt is added. Nut butter is made of practically every oily nut, but the quantity of peanuts ground into butter is many times greater than that of all the other nuts combined.

Peanut oil is another nut product that offers great possibilities.

Nut milk is another product made from nuts.

This is made by pouring boiling water on ground nuts, draining off the liquid, and allowing it to

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A field of peanuts. Growing peanuts is a profitable industry, the high oil content of the nuts making them especially valuable for the manufacture of nut butter

settle. Then a kind of cream or milk gathers. Some of these nut milks, especially that of the Java almond, are used as food for infants.

We can buy nut pastes, nut preserves, and candied nuts. In almost every country in the world nuts are used as ingredients in various dishes, in sirups, and for mixing with fruits for conserves.

But we must not forget the nut meals and nut flours which are used in many ways. Nut meal is considered easy to digest. Chestnut flour is used in bread and cakes, forming one of the principal articles of food of many people in France and Italy. Sweet acorns are also ground into flour and are said to make a very good bread. In fact, in various parts of the

world, nuts take the place of such cereals as wheat, corn, oats, and barley.

Many centuries ago nuts were one of the principal foods of man, and in some countries this is still true. It would be difficult to imagine a way in which nuts are not eaten. Nut fritters, like our corn fritters, for instance, are very popular in Tuscany, Italy.

Have you ever tasted nut coffee? Nuts of many kinds are roasted and ground and a drink made of them in the way we prepare coffee. Roasted nuts also form an important part of certain popular cereal drinks. Since nuts contain oil, roasting affects them as it does coffee. So it is not surprising that drinks pleasing in taste may be made from them.

In the future when you think of nuts, you should remember that they are among the richest of all foods, that they can be prepared in a multitude of ways, and that they equal or surpass any other food in nourishment.

Chapter XXVII

SUGAR

Sugar a world product. There are many reasons why sugar is one of the most interesting of the world's great staple crops. It is produced in commercial quantities in almost every country of the torrid and the temperate zones. With the possible exception of salt, sugar, either as a natural element or as an added ingredient, enters into more different articles of our diet than any other food product. It makes a more universal appeal to the palate of the world of children, adults, and even dumb animals than any other food element that exists. Finally, it is consumed in such enormous quantities in every part of the world that in both tonnage and dollars it constitutes one of the largest single items of food traffic passing through the hands of the wholesale and retail dealers. At the same time sugar perhaps yields to those who handle it the smallest percentage of profit of any known food.

We are told that the manufacture of sugar from sugar cane is older than history, and that reference to it is found in the Sanskrit of ancient India. The cultivation of sugar cane seems to have been common in India and China in remote times. The Greeks and Romans used sugar, but for medicinal purposes only, obtaining it from India at great cost. It was introduced into Europe from the East soon after the conquests of the ninth century.

We are also told that sugar cane was grown in Syria and on the island of Cyprus as far back as the

middle of the eleventh century. From there it was carried into Sicily and other parts of the southern coast of Europe.

Sugar cane was brought to the West Indies in 1494. It at once gained a strong foothold and became one of the principal crops of the islands. Almost immediately the West Indies became the world's leading sugar producers. To-day cane sugar comes

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Unloading cane at a sugar mill, Natal, South Africa

from the West Indies — especially Cuba and Porto Rico — South America, Java, India, the Philippines, Hawaii, Mexico, Egypt, the island of Mauritius, Taiwan, and from our own Southern States, and the cane is grown in practically every tropical country.

Sugar cane and raw sugar. Sugar cane grows in single stalks, the mature cane reaching a height of from eight to twenty feet. A plantation of cane looks much like a field of Indian corn stalks of enormous size. From the upper portion of the cane

its long, blade-like leaves extend outward in great tufts or showers. The cane is ready to cut in from

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Loading sugar cane into cars on a plantation in Cuba

twelve to sixteen months from the time of planting. As it ripens it becomes very heavy, and if a strong wind occurs the cane falls to the ground in a tangled mass, thus adding much labor to the task of harvesting. The stalks are cut by hand, and as many as a hundred negroes may sometimes be seen working in one small field.

Immediately after the cane is cut it is stripped of its leaves, topped, and loaded on carts and hauled to the mills. Then it is converted into raw sugar for shipment to the refineries in more northern countries.

In the mills the ripe cane is passed between large, rough rollers called crushers, which break it up. After this it passes between several sets of triple rollers which press out the juice. As the cane passes from one set of rollers to another it is sprayed

with water in order to extract more of the sugar sap. Modern mills employ twelve to eighteen of these immense rollers which apply a pressure of five hundred tons. When the crushed cane comes from the last set of rollers the remaining fiber is dry. In the

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A sugar cane crusher. In all the countries where modern inventions have been installed for the cultivation of the cane and the extraction of its juices, the sugar industry is highly profitable

sugar world this fiber is called "bagasse." The bagasse is conveyed from the rollers directly under

the boilers, where it is burned to make steam with which to operate the mill.

The juice as it is crushed from the cane runs through great filters and clarifiers and finally into the vacuum pans where it is boiled or evaporated until it forms crystals. You know that when you are making candy your sugar sirup will boil back into sugar, or crystals, unless you are extremely careful. That is just what the sugar manufacturers want this cane sirup to do. After the sugar sirup has boiled into crystals, it is placed in centrifugal machines, where it is whirled round and round many hundred times a minute. As the crystalline mass revolves rapidly the molasses passes through the fine wire screens of the machine, leaving only the yellow sugar crystals, called "raw sugar." Then the machines are stopped, and the raw sugar

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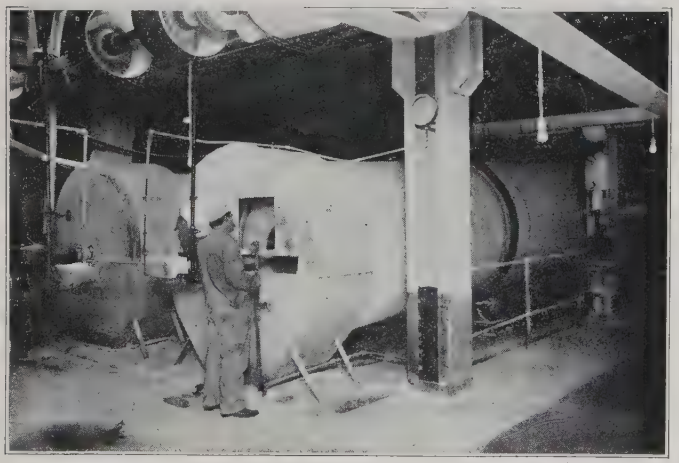
Sugar cane waiting to be unloaded at a factory in Cuba

scraped into conveyers which carry it to the packing room where it is run into bags and shipped to the northern refineries.

Refining sugar. When the raw sugar reaches the refineries it is stored in large warehouses, from



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In the granulating room of a sugar refinery. The recrystallized sugar is granulated in these huge machines

which it is drawn as needed. Many of these refineries are thousands of miles from the mills and the raw sugar must be carried by steamship to them. When the raw sugar reaches the refineries it contains many impurities which are all removed in the refining processes. In fact, the final white sugar from the refineries is one of the purest foods known — being practically 100 per cent pure.

In the refinery the sugar is first melted into a sticky liquid and while in this condition is passed through various filters and clarifiers, whence it flows a clear, brilliant, water-white sirup. This purified syrup is then put into vacuum pans and the water evaporated from it, the sugar in this way being recrystallized.

Kinds and grades of sugar. Sugar, as you know, is put up in many grades and forms. The recrystallized product is used to make the various white sugars, such as granulated, powdered or pulverized, and rock sugar. Loaf sugar is the same as granulated, only it is poured into frames or moulds and cooled into large sheets, from which the lumps of various sizes are cut. Pulverized sugar is merely granulated sugar ground very fine or powdered.

Molasses is the liquid and uncrystallized sugar which is separated from the sugar crystals in the centrifugal machine. Molasses sugar is obtained by boiling molasses.

The beet-sugar industry. Now besides sugar cane there is another plant that yields sugar. This is the sugar beet, which furnishes about one half the sugar we use. No doubt you are all familiar with the sugar beet, though its history is not so old as that of the cane.

In the year 1747 a German scientist discovered the sugar properties of the beet, but it was not until about 1810 that the production of sugar from the beet was seriously considered in a commercial way. At that time the wornout fields of Europe yielded an average of only about twelve bushels of grain per acre and with so many people to feed great numbers were in danger of starvation. Then the French discovered that for three or four years after they had planted a field in sugar beets, it would yield twice as many bushels of grain as it did before — furnishing, of course, food for twice as many people. This yield was no doubt due largely to the deep plowing necessary for the production of the sugar beet and to the deep tillage done by the burrowing of the

beet itself. When this became known and the true value of the sugar beet began to be understood,

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Cultivating a field of sugar beets in Germany

Napoleon I appropriated 1,000,000 francs, or about $200,000, to be used in establishing government factories and schools in which to teach sugar making.

He then ordered French farmers to plant 90,000 acres to sugar beets to supply the hundreds of little new sugar mills that were built throughout Northern France. Soon after this became known, other European nations began to plant sugar beets and build sugar factories and at the opening of the great world war these countries had more than 1,300 big sugar factories which produced 8,000,000 tons of beet sugar a year.

Millions of families depend in peace times largely upon the beet-sugar industry for their living. In normal times whole sections in Belgium, France, Germany, Austria-Hungary, Sweden, Russia, and

other European countries are given to the cultivation of the sugar beet. It is, of course, grown in rotation with other crops.

By 1880 the beet-sugar industry was successfully established in the United States. To-day we have about 80 huge factories costing nearly $100,000,000 and producing annually more than 700,000 tons of white sugar.

Great care has been given to the breeding of sugar-beet seed. Whereas in the early days of the industry

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Kansas farmers delivering sugar beets at a factory

the beets weighed but a few ounces apiece and contained but 4 to 5 per cent of sugar, they now weigh several pounds apiece and contain from 15 to 20 per cent of sugar. There are many large sugar-beet seed farms in Europe that ship seed to all the countries which produce beet sugar.

We have learned that in extracting sugar from cane the juice is squeezed out between many sets of big rollers. The process of extracting the sugar

from beets is quite different. Instead of being crushed, the beets, after they are washed, are cut into long, slender slices, about as large as a small lead pencil. These slices are then run into what is called a diffusion battery, which consists of a series of coils, each of which holds from five to ten tons of slices. Then hot water passing through the beets coaxes the sugar out of the tiny cells in which nature stores it.

Next the water which has absorbed the sugar is filtered and clarified and boiled down so that the sugar crystallizes—almost a repetition of the process of making sugar from cane juice. Unlike the cane-sugar factories of the tropics, which produce only raw sugar and send it to the northern refineries to be purified, our beet-sugar factories complete the process and market only white granulated sugar, ready for the table. But in European countries, the beet-sugar factories for the most part make only raw sugar which is sent to big central refineries for purification.

A candy-loving nation. Candy is perhaps the most popular form in which sugar is served to the American people. We eat almost $200,000,000 worth of factory-made confectionery a year in this country. This does not include the tons of fudge, taffy, and other candies made in the homes. There are, according to the United States Department of Commerce, more than 2,500 factories in this country making candy under the inspection of the national and state governments. Not only is our national taste for sweetmeats highly developed, but we have probably brought the art of candy making to its highest point. We export

a little less than $1,500,000 worth of candy a year and import about $150,000 to $250,000 worth.

There are few industries in the United States which have increased more rapidly in recent years

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Transferring Cuban sugar cane from carts to railway cars for shipment to the mills. Of the two million tons of sugar imported into the United States, Cuba supplies more than 95 per cent

than the manufacture of candy. It is well for this candy-loving nation that great and increasing care is taken to see that only pure and wholesome candies are permitted to be made and sold.

Production and use of sugar in United States. In a single year the people of this country consume about 4,000,000 tons of sugar, of which the United States and its outlying possessions produce nearly 2,000,000 tons. Of the 2,000,000 tons imported, more than 95 per cent comes from Cuba. As we study these tremendous figures we must not forget that our own

Southern States produce more than 200,000 tons of cane sugar a year; that the sugar produced in Porto Rico and Hawaii together is five times this amount; that the Philippines yield more than 100,000 tons a year; and that our Western States in a single year will produce more than 700,000 tons of beet sugar.

The quantity of sugar consumed in the United States amounts to about 80 pounds per year for each man, woman, and child in the country—a greater amount for each person than is consumed in any other country except Great Britain, Denmark, and far-off New Zealand and Australia.

Germany and Russia are two of the leading beet-sugar-producing countries of the world, and they consume tremendous quantities of sugar. The world's total production of sugar for a year is about 19,000,000 tons.

Maple sugar. There is another sugar which is in high favor because of its delicious flavor, for certainly maple sugar is one of the most delicious products known to our tables. Almost any person brought up in New England or in any of our Northern States east of the Mississippi River knows how this kind of sugar is made. The maple trees are tapped and spouts driven into the incisions. When a "run" of sap is on during the "sugar weather" of the early spring, the sweet sap trickles through the spouts and drops into buckets. The sap is emptied into barrels usually mounted on a low sled drawn by horses or oxen. At the sugar house the sap is emptied into a storage tank which feeds into a large flat pan or evaporator over an "arch." Usually there are a series of these pans. These not only permit the sap

to be heated gradually, but furnish broad, shallow surfaces which spread the sap in thin sheets, thus

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Early spring in New England. Tapping a tree for a "run of sap" in a maple sugar camp

making the process of evaporation much more rapid than if the boiling was done in a large kettle.

If this maple sugar was melted and run through the filters and clarifiers of the refinery you would have exactly the same sugar you get from the cane and the beet. Raw cane sugar, raw beet sugar, and maple sugar each has an odor and flavor peculiar to the plant which produces it, and these are subject to complete change by refining.

Raisin sugar. There is still another sugar with which you probably are not familiar, but which I am sure you would like. Yet, there are many foreigners among us and not a few Americans who constantly call for raisin sugar, which is imported from the Levant in cans containing from one to five pounds. If you do not know what or where the Levant is, it will be a good idea for you to look it up, for you will meet that word often in your study of geography and history. The best grades of raisin sugar have a decided raisin flavor and are well classed as a luxury.

Other sugar-producing plants. There are other sugar-producing plants, trees, and fruits besides the sugar cane, the sugar beet, the maple tree, and the raisin. But because more labor is required to extract the sugar, and because these plants do not possess so large a percentage of sugar and are harder to cultivate, they are not grown for the sugar they contain. Very ripe bananas have a high percentage of sugar; so have certain cacti, and potatoes, grapes, corn, and various trees other than the maple. But the yield is not enough to justify their use as sources of sugar. In fact, practically every food we eat contains some sugar, but in many foods the percentage is so small that a ton of it would not produce a pound of sugar. Therefore, when we speak of sugar we naturally think first of the cane, next of the beet, and then of the maple tree.

Chapter XXVIII

SPICES

A luxury of long ago. Spices are especially interesting from the fact that each is a quite different part of its respective plant. The clove is a bud, the nutmeg a fruit, and cinnamon a bark. Commercially, mustard and ginger are usually classed as spices. Mustard is a seed, and the ginger used for seasoning and as a confection is a root. Spices and the fragrant herbs used for seasoning the foods served on the table of the average laboring man to-day were once enjoyed almost exclusively by the rich, and were regarded as luxuries rightly belonging to royalty.

Many references to spices may be found both in the Bible and in the early histories. These show how highly they were regarded in ancient times by kings, emperors, and princes, and by all the rich and powerful. There is, perhaps, even more in the chronicles of the Middle Ages to indicate that among gifts thought suitable for monarchs spices and "pleasant herbs" held high rank. In a sense they were regarded as belonging in the same class as rare wines, precious ointments, and perfumes.

Perils of the spice trade. Perhaps the regard of the ancients for spices was partly because those most highly prized were nearly all grown in remote South Sea islands. They were to be had only in small quantities and after long and dangerous voyages in seas beset by pirates and swept by the terrible storms peculiar to the Indian and South Pacific oceans. The true adventurers of the seas from the

earliest days of navigation down to the present time have been the ships that touched at the faraway

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The wharf at Singapore. The capital of the Straits Settlements is the most important halting place on the great trade route to the Far East and the chief port in the adventurous lands of the spice trade

islands of "The Straits" and bartered gay cloths, beads, and gaudy trinkets for bales of spices wrapped in queer coverings of woven reeds and native grasses. To catch the scent of a ship in the spice trade, even to-day, is to breathe the odor of adventure. While it is true that piracy has practically been driven from the high seas, there are still many perils in store for the ships of the spice trade. Even to-day there is no lack of adventure in the traffic that brings the cinnamon, the allspice, and the cloves, which give out so tempting a fragrance as the pies, cakes, and other dainties come from the oven in our kitchen.

Geography from real life. How easy it is to remember a lesson in geography that has been made a living thing because of some personal association

connected with it! No doubt most of the boys and girls who see this book have read some of the stories by Robert Louis Stevenson, especially *The Wreckers* and *Treasure Island*, which describe the exciting adventures of sailors in the romantic islands of the South Seas. To the writer these islands—where most of the world's spices are grown—seem very real because he has heard Mrs. Robert Louis Stevenson tell the strange adventures that befell her and her famous husband as they cruised idly through these fascinating but treacherous seas. Another personal link that has helped make the geography of the spice trade more vivid to the author was his acquaintance with an English sea captain who had sailed these waters. One of his descriptions never to be forgotten was that of passing to the leeward of the island of Ceylon when the fragrance of the spice harvest, carried far out to sea, brought to mind the familiar lines of that old "Missionary Hymn":

"What though the spicy breezes
Blow soft o'er Ceylon's Isle."

"Spicy breezes," this sailing captain declared, was no mere figure of speech, for the aromatic fragrance of the spices may be detected for a surprising distance out at sea.

The original spice markets. In medieval times, Arabia was the home of the rich spice merchants and the world's great spice markets were maintained there. Important as the spice trade was in those days, it became still more so in later years, and had much to do with the making of European and colonial history. In fact, the principal articles of trade between Europe and the East Indies have always been spices.

The spice markets of to-day. In one year the United States imported more than 27,000,000 pounds of unground black and white pepper and more than 23,000,000 pounds of unground spices. These spices came from the Netherlands, England, France, Austria-Hungary, Spain, the Dutch East Indies, the Straits Settlements, British India, Siam, China, Japan, Zanzibar, Jamaica, Mexico, and the Philippines. Of course, most of the spices we received from England, the Netherlands, and France came originally from their colonies and possessions in the tropics.

Picking cloves in Zanzibar

Penang the spice-producing center. Practically all spices grow in hot climates, and close to the ocean. Intense heat, together with the salt sea breezes, seem necessary to produce that highly aromatic, snappy quality so characteristic of every kind of spice. Scarcely any pastime could be suggested to a boy or girl more interesting than an imaginary cruise to the various islands where most of the world's spices are grown. Suppose you spread before you a map of the world, drawn on a generous scale — one that shows the principal ocean routes — and play what may be called the spice game.

Spices and nuts. Where the world gets its principal spice and nuts

First, find Penang, one of the Straits Settlements; Pulo Penang, or Betel-nut Island, is its native name.

Penang is perhaps the most interesting island in the world, so far as the growing of spices is concerned. Its name is so inseparably associated with the growing of spices, especially pepper and cloves, that its mention at once suggests the aroma of vast spice plantations. Not only does it grow cloves, but almost every known kind of spice; and, both in quality and in quantity, its production is remarkable.

The intense tropical heat and the humidity force the spices to give out their fragrance with an almost overpowering generosity. The atmosphere is heavy with the pungent odor of the clove, most fragrant of all the spices. The fragrance of a pine or balsam forest in the North is mild in comparison with the perfume drawn by tropic suns from the spices of a South Sea Island plantation. You would undoubtedly find the perfume too strong to be pleasant.

Culture and curing of the clove. The clove tree is an evergreen sometimes growing to a height of forty feet. When seven years old it bears buds which, white at first, gradually turn crimson and then dark red. They are picked before they expand into flowers and are cured either by smoking or by drying in the sun. When cured they are dark brown in color. While the clove tree is supposed to bear two crops a year it cannot be depended upon to do this. Yet on the other hand, if well situated and properly cared for, the clove tree will continue to bear until nearly a hundred years old.

Struggle for control of clove industry. The history of clove culture is a dark one, for the ambition

to gain a monopoly or control of the world's output of cloves resulted in much violence and many crimes. Altogether the blackest chapter in this history was the warfare between the Portuguese and the Dutch for control of the clove industry.

At one time the Portuguese held the Moluccas, then known as the Spice Islands. They had large and fruitful clove plantations on practically all of them. Amboina, one of the most interesting of the Spice Islands, was then—as now—owned by the Dutch. It had been brought under a high state of cultivation, especially as to the production of cloves. The Dutch now began to cast covetous eyes upon the thriving plantations of their Portuguese neighbors. And Dutch colonizers of those days had the courage of their desires—they could fight as well as farm. The fact is that few of any race or nationality who had the courage to brave the dangers of the South Seas to try their fortunes in the Spice Islands were at all particular about the means they used to gain what they wanted. The Portuguese cared no more about the right or wrong of an act than the Dutch. But history seems to credit the Dutch with starting the Spice Islands feud by raiding the Portuguese plantations and destroying the trees. The fiery Portuguese planters defended their property with stubborn bravery, retaliating when they could.

But the prize for which they both contended so bitterly did not fall permanently into the hands of either.

Spread of spices to other islands. Nature herself defeated the selfish motives of these Dutch and Portuguese adventurers. Shrewd and clever, they saw quite as clearly the riches to be gained by a

monopoly of the spice trade as the keenest promoter or greedy captain of industry of to-day sees the gains

Gathering cloves after they have been dried

to be had from an unfair advantage. But they failed to realize the fact that the South Seas were generously set with many other islands quite as well suited to the growing of spices as the Moluccas. While they were fighting, adventurers like themselves had been busy planting clove trees on other islands.

These men who dreamed of cornering the world's production of cloves had overlooked some of the greatest clove-producing islands of the world. The growing of cloves on the island of Zanzibar, just off the east coast of Africa, began just in time to upset the plans of the Spice Island planters. Later, plantations sprang up on Penang,—where now the choicest cloves perhaps in the world are grown. These plantations yielded fortunes to generation after generation of spice kings who controlled them.

Picturing the spice kings. Before we dismiss those old pioneers of the Spice Islands, it will be interesting to try to picture them as they appeared some two hundred years ago. We shall probably not be far wrong if we think of them as looking like the pirates of Howard Pyle's famous illustrations. Certainly the fierce, swarthy, black-whiskered Portuguese fit perfectly into the picture with the ferocious Malay pirates that then scoured the Bay of Bengal and the Indian Ocean for any helpless ship they could overhaul.

Hardships of the spice grower. When you try to picture the conditions surrounding the production of the spices which add a pleasing tang to home-made mince pie or pickled pears, you will do well to remember that the heavily scented air, the brilliant flowers, and the gorgeous birds do not make up the entire background. The picture lacks completeness unless you are able also to see something of what it means to subdue a tropical jungle and transform it into a thriving plantation; to realize that deadly fevers, poisonous snakes, and swarms of maddening insects have claimed thousands of victims wherever spices are grown or gathered. The planter of to-day in spice-growing islands does not have to contend, as did the pioneers in this strange kind of farming, with hordes of Malay pirates and with covetous competitors. He has also learned how, through the introduction of modern sanitary methods, to reduce greatly the perils of the tropical jungle. At the same time, he finds no lack of hardships and adventures so long as he lives where his spices are grown.

Why spices are costly. These things give us more than a hint as to the reason why spices have always

been and probably always will be comparatively expensive. It is but natural that we should be expected to pay a premium on an article of food brought from the most remote and inaccessible islands of the sea—a food raised under the torrid sun of the tropics and calling for the constant sacrifice of comfort on the part of the producer.

The story of the clove industry is typical of almost every other spice and is sufficient to suggest what has taken place wherever the spice trade has been established.

Two spices from one fruit. The nutmeg is the pit or kernel of a fruit which, when ripe, looks something like a small peach. The pulp of this fruit is quite unpleasant to the taste. Inside the pulp is a red flesh known as "mace"—one of the most popular spices known to modern cookery. When you taste a dish flavored with "mace" you will know that you are eating what was once the soft red covering of a nutmeg. Nutmeg trees properly located and well cared for are remarkably prolific. In one year a single tree has been known to produce more than two thousand nutmegs. The nutmeg blossom is white, bell-shaped, and as fragrant as it is beautiful. When eight years old the tree begins to bear, often continuing to yield fruit until it is seventy-five years old.

Although there is ripe fruit on the nutmeg tree the year round, the principal harvest occurs in the fall of the year and a smaller one in April, May, and June.

Preparing nutmegs for market. The harvesting of nutmegs is very interesting. The berry or pit of the fruit is first separated from the surrounding pulp

and placed over a slow fire to dry. Then the shells are cracked and the kernels, or nutmegs, sprinkled

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Nutmeg tree and fruit. The kernel of this fruit is the nutmeg of commerce. The red flesh supplies the popular spice known as mace

with lime to protect them from insects. They are now ready for shipment to the markets of the world. Nutmegs are grown in Penang, the Celebes, and also in some of the islands of the West Indies. These islands furnish the bulk of the supply used in

America, which is by far the largest consumer of nutmegs. Africa and South America also have nutmeg plantations.

Harvesting and shipping cinnamon. Much choice cinnamon is grown in Penang. This fragrant spice is supposed to be a native also of the island of Ceylon. This island is possibly the real center of cinnamon production. Cinnamon is also grown to some extent in the East Indies. Cassia, another variety, comes from China as well as from the East Indies.

Nearly every boy and girl knows that cinnamon is the bark of the small branches and twigs of the cinnamon tree. The irregular pieces of bark are called sticks, and all cinnamon is shipped to wholesale grocers in stick form. This form is not only

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Natives preparing stick cinnamon for foreign markets

more convenient but is necessary in order to preserve the strength and fragrance of the cinnamon.

Grinding spice, like grinding coffee, releases the aromatic oils. If the ground spice is then exposed to the air its fragrance and flavor are soon lost. For this reason many housewives have preferred to buy cinnamon and other spices in their natural forms and grind them as needed. This practice, once almost universal, is not now nearly so general. Doubtless the change is due largely to the improved airtight packages in which ground spices are sealed. In such packages the strength cannot escape into the air.

Foreign and home-grown pepper. Probably very few American boys and girls know just what black or white pepper looks like growing in the plantations. Very likely the commonest notion is that the black and white pepper from the grocery store in its natural state looks like the green peppers, or the sweet peppers, generally found in our kitchen gardens. The truth is that there is very little relation between our garden pepper and the pepper of commerce. The black or the white pepper in the shaker on your dining table once grew in the form of berries on a climbing shrub in a garden of Southern India, Sumatra, Java, Ceylon, Siam, Borneo, Penang, or some part of the Malay Peninsula. In the natural state the berry is red, but curing turns it dark brown or black. White pepper is produced by certain variations in the curing process.

Cayenne and other red peppers. Find Cayenne, French Guiana, on your map. Our cayenne pepper gets its name from this town, although much of our supply comes from Zanzibar, Mombasa, and Sierra Leone, Africa, and from Japan. Both cayenne pepper and red pepper are the powdered ripe pods

of a small plant bearing a bright red fruit. The United States has ruled that true cayenne pepper is

Packing spices. The modern airtight packages into which ground spices are sealed preserve their flavor and fragrance

obtained from the small red pepper pods, and that common red pepper is from the large pods. A great deal of our red pepper comes from Mexico, our own Southern States, and from both the East and the West Indies.

Paprika is grown principally in Hungary, although we buy much of this product from Spain. Paprika is now being grown in America in increasing quantities. It is the dried flesh of a large, long red pepper, powdered, and is mild in taste. It is used extensively for flavoring salads and in making sauces and pepper vinegar.

Louisiana is the home of tabasco, a long-podded red pepper, somewhat similar to the paprika. This is made into a rich, extremely strong sauce served

in salads, soups, and other dishes and on meats and oysters. As tabasco is perhaps the strongest of all sauces or flavorings, it should be used only in moderation.

Our imports of pepper. You shake but little pepper upon your food, hardly enough to be seen. A mere drop of tabasco is all that one requires to flavor a bowl of soup. Yet you will be astonished to learn how many pounds of pepper we import from other countries in a single year. The total exceeds 25,000,000 pounds. Besides this supply, remember, we grow millions of sweet peppers in our own gardens, and our Western and Southern States have many acres planted to the stronger varieties.

Chapter XXIX

SALT

A food that flavors. There is one food the taste of which in itself we do not like, but without which almost every other food that we eat would be flat, stale, and unpalatable. We use it at every meal and physicians say we could not live without it. Of course we refer to salt. Perhaps you never seriously thought of salt as a food, but it is, and it is necessary to the health and comfort of both human beings and dumb animals. If your father is a farmer you have no doubt noticed that he has a "salt rock" in his pasture or else occasionally gives the stock a little coarse salt. Possibly, too, you have read how deer and other wild animals go to the "salt lick," braving many dangers in order to secure a little of that food which we are inclined to regard so lightly.

The American Indians discovered the value of salt and found ways of securing it before the white man brought it to them. The salt springs of western New York, in the greatest salt-producing section of the country, were known to them before pioneer settlers began to gather salt there.

Salt present everywhere. As to where it comes from—get your map of the world and place your finger at random upon a spot, almost anywhere on it. Then say, "Salt can be obtained here," and you will very likely be correct. In other words, salt can be had from its original sources in practically every region in the world, as well as from every shore which the ocean washes.

Because the earth is rich in veins of rock containing salt it is possible to dig down and strike a

Courtesy of Wallace Evans

Deer on a game preserve licking salt. In pioneer days the woods were often full of deer-paths which ran to licks near salt springs

salt vein or "lead" in almost any inland region. Then, besides this, there are inland bodies of salt water which furnish salt and great mines where rock salt has crystallized in immense quantities.

This does not mean that salt may be found in paying commercial quantities in almost every general locality—far from it! But it does tell us that nature has been kind enough to give a very generous geographic distribution to a food element necessary to the health and comfort of all animal life.

Although there are many million pounds of this food used each year there is no fear that the supply will be exhausted as there is practically no region in the world where it cannot be secured.

Three ways of obtaining salt. There are really three ways in which salt may be secured; first, by

mining; second, by evaporating sea water; and third, by digging wells until a salt vein is struck and then pouring down water and pumping it up again as brine. When the veins or leads of salt lie at a great depth below the surface, it is usually much cheaper to resort to the brine-well method than to mine it out like coal. This brine is put through a plant which heats, filters, and evaporates it, leaving only the dry salt. When this product is refined, sifted, and graded it is ready for sale and use.

The salt which is mined is called rock salt and must be crushed or ground before it can be used for table purposes. There is also a solar salt which is evaporated by the sun, and which finds a ready and extensive sale.

In securing salt from the ocean the water may be

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A great salt plant in northeastern Ohio. Here the salt is made from brine secured by digging wells

boiled and the salt thus removed, or it may be evaporated in the sun. In some countries great

shallow beds are scraped out in the sand of the sea shore and when the tide goes out the sun evaporates the water, leaving a deposit of dry salt in the beds. This method is employed extensively in France and other European countries.

In Utah we have Great Salt Lake, where many thousand carloads of salt are gathered each year and shipped to various points throughout the country. There are also salt marshes in many parts of the country, and flowing salt-water wells. The ground about these wells is carpeted with a thick crust of salt.

Very likely you will be inclined to ask why all animals—both human and dumb—require salt. The answer is that salt contains two elements

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Loading rock salt in an underground chamber of a salt mine

which are very essential to the processes of digestion. These elements are sodium and chlorine.

The history of salt. Like some of our other foods, salt has an honorable history. It is given a worthy

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Salt awaiting shipment on the vast beds near Salt Lake City, Utah

place in the Bible and in histories and was one of the chief articles of trade carried by early caravans that crossed the deserts and wild countries of the ancient world. And salt did its share in the making of history during the Roman rule: in Rome a certain street was named the Salerian Way because it was there that salt dealers lived. The Romans worked the salt mines of England at the time of the invasion. Venice, too, was noted for her salt works, which had much to do with the upbuilding of her powerful fleet of commercial and fighting boats.

In Russia there are great salt fields where both men and women spend most of their lives in hard and cheerless toil. Many children contribute their

labor to this industry in practically all European countries.

Other uses of salt. You know, of course, that salt is necessary for many purposes besides that of flavoring our food. For example, it is used extensively for preserving hides; as a preservative of food it is invaluable; in refrigeration, in chemistry, and in medicine it has a wide use.

Our importation of salt. In spite of the fact that we have more salt in our own country than we can ever use we imported more than 275,000,000 pounds in one year from England, the British West Indies, Italy, Spain, and the Dutch West Indies. You have no doubt learned by this time that there are people in the United States who insist upon having imported foods, and even imported water. And there are people in other countries who ignore their own foods and import ours. Of course in many cases there are reasons for this expensive exchange of products that do not appear upon the surface of the transaction; on the other hand, it is often the result of an ill-founded whim without any good reason.

Chapter XXX

TEMPTING TABLE DELICACIES

The delicatessen. There is probably no other place, outside of a great wholesale grocery, where you may get, at almost a glance, so sweeping a view of the geography of foods as in a thoroughly modern delicatessen store. This is because these fascinating little food shops specialize to a large extent in the delicacies of foreign lands.

As its name suggests, the delicatessen is a place of delicacies, of dainty and unusual foods displayed to stimulate a sated and, perhaps, jaded appetite. As we enter the delicatessen store we are at once attracted by the cleanliness and the sanitary condition, not only of the store and its employes, but of every package, glass, jar, and bottle in the place. Here cleanliness reigns supreme, for nothing so surely tends to discourage appetite as uncleanliness and disorder.

Everything in a high-class delicatessen store is so temptingly displayed and so clean that it makes one feel confident that whatever he buys there will be of the best. Under the marble slab upon which are ranged the cold meats, the ammonia coils glisten with frost and lend a crisp freshness to everything near them. The cakes, breads, and pastries are placed in airtight glass cupboards and handled only when necessary, and then with the greatest care. The tiny glass kegs, or jars, which hold the pickles are as sweet and clean as constant scouring can make them. The whole store shines.

If you live in a large town or city and are familiar with the stock of a first-class delicatessen store you

A fine display of olives and pickles on the shelves of a high-class delicatessen shop

will know, at first hand, something of the labor, money, and taste expended in order to prepare and display foods in a tempting manner.

Many delicacies have been introduced to awaken the relish for food. Each year finds many new kinds of these fancy foods on the market. We draw a supply of these from practically every country in the world. Let us look at the map again and see just what countries furnish us with some of the most curious and interesting of these special temptations to the flagging appetite.

From the four corners of the earth. Draw a line from your home to New York City, from there to London, and thence straight to Calcutta, India. If your parents are lovers of chutney, the famous East India relish, and are in the habit of keeping it on their table, you may look at the bottle with a new interest as you realize that it has actually traveled

the route that you have marked out. Draw another line from your home to France. It is from this country that we get crêtes de coq, or cocks' combs, which are used for garnishing, and from France we also receive many fruits in sirups and glacé, including brandied rosebuds and candied chestnuts. From Spain and Portugal we get both fresh and candied or glacé grapes. Russia sends us caviar (roe or fish eggs). From England we get many sauces and relishes; from Germany come various young vegetables canned. Westphalia, Germany, supplies us with Westphalian ham and bacon, and Hungary furnishes famous and expensive sausages known as salami.

All these foods are prepared and shipped across the waters to tempt the palates of those who like fancy foods at fancy prices.

Products of many lands. Now suppose we name a few of the appetite coaxers that may be found in a first-class delicatessen or fancy grocery department.

Here is a Hanover tea sausage from England, and next to it is a dainty sausage from Bohemia. That small white jar contains orange marmalade from England and beside it stands a bottle of pickled black walnuts from the same country. There are bottles of mixed fruits from France and guava jelly from the West Indies. Here are the famous date-nut butter from Persia, ginger in sirup from China, and crystallized ginger chips from England. There are tin boxes of biscuits, cakes, cookies, and all sorts of fancy pastry from England, Austria, and France, packed so as to be in perfect condition when opened.

Next to the end is a row of bar-le-duc from Bar-le-Duc, France. On the shelf below are several jars of brandied peaches from our own New York state

and next to them are preserved figs and pickled figs from California. Those plump, delicious candied cherries come from France, and the apricot pulp is from Spain. There are some kumquats, or Japanese oranges, in marmalade. Near by are boxes of macaroni and vermicelli from Italy. There is some arrowroot from the Bermudas and alongside are tangerines packed in Spain.

On the vegetable shelf we see some tomato paste,

Eighteen articles from a delicatessen used in making an "International Salad"

a concentrated food, which comes from Italy. There are some cans of tiny white turnips from Belgium, cans of spinach from France, and a small bottle of choice pimiento peppers from Spain. From Italy we also get olive farcies, or olives stuffed with anchovies. Those at the end of the shelf are from France. That can of paprika pepper is from Hungary and the bottle of tiny pearl onions hails from Holland. The cans of small carrots are the product of Belgium, and the peas, of Belgium and of France.

The corn on the ear in that bottle came from Germany and those capers, the flower buds from the caper bush — used for pickles, garnishes, and sauces — were sent from France. Holland furnishes the cans of cauliflower, and the jars of tiny lima beans were sent here from France. So, too, were the artichokes alongside them. There are some canned brussels sprouts and some cèpes, or wild mushrooms, all from France. That jar of imported honey was made from flowers growing in Switzerland, on the slopes of the Alps.

The truffle hunt. There is an interesting story connected with that can of truffles. The truffle is a variety of fungus and is possibly the most curious and least understood of any of our foods. Although it has been eaten for hundreds of years, man has never been able to produce it at will. It grows in clusters a few inches below the surface of the ground, much like potatoes, but has neither foliage nor roots of any kind. It is one of the most expensive of all foods, sometimes selling for as much as four dollars a pound. The truffle is round in shape, about the size of a walnut, although sometimes much larger, and is usually blackish gray in color, netted with fine white veins. It is commonly found in forests of oak and beech trees. The most famous variety comes from the French province of Perigord.

Truffles absorb so much of the vegetable food elements of the soil that nothing can thrive near them save the trees which give them the required shade. Although oaks and beeches in Perigord are indications of "truffle ground," the task of finding these almost precious little globes of fungus is by no means an easy one. As no part of the truffles themselves

shows above the ground, they are usually located by trained dogs or pigs, that scent the peculiar odor of

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A French peasant and his pig out on a truffle hunt

the truffles and start digging for them. Truffles are also found in England, Germany, Italy, and occasionally Spain, but France is the main source of the world's truffle supply.

There is something almost absurd in the picture of a French peasant plodding alongside an anxious pig snuffing his way through the forests of Perigord, or as it is now known, the Department of Dordogne. Although the pig loves the taste of truffles, he has no chance to indulge it, as his master carries a hoe or spade with which he digs up the truffles as fast as the pig finds them, and puts them in the sack which usually swings from his shoulders. The pig, however, does not go unrewarded. The peasant always carries a sack of food for the animal, and

when the pig locates a truffle he immediately taps him on the back with a stick and gives him a small bit of the food as a substitute for the fragrant truffle.

Truffles come to us in cans and bottles and are used mostly for garnishing and flavoring. The choice portions of the truffle are very expensive, but the parings from peeled truffles may be bought at a moderate cost and are very good. A tiny slice of truffle will flavor a whole dish of food.

Rare and unusual foods. If you look over the dainties in a delicatessen of the most "fancy" kind you may possibly find a can of kangaroo tail that has come to us all the way from Australia. There the natives eat kangaroo meat as Americans eat

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French women cleaning truffles. As the tubers are rough or warty, the workers use stiff nail brushes

beef, but they ship us only the choicest portions of the tail meat, which is considered a rare delicacy.

Sorrel, or acid weed, is imported from France and used like spinach. Breasts of ptarmigan, a small bird of the grouse family found in Arctic America and in Norway, come to us put up in cans.

Side by side in the delicatessen store one may find meat balls from Norway and pâtés de foie gras, or potted goose liver, from France and Germany. If you could see a French farm devoted to the production of this delicacy, you would think the sight a very strange one. You would find scores, even hundreds, of goslings kept in long rows of tiny pens, each compartment just large enough to hold a single fowl without giving it any chance whatever for exercise. The purpose of this restraint is to cause an enlargement of the creature's liver—a natural result of overeating without taking a normal amount of exercise. These goslings are stuffed from early infancy until they are mature geese. They enjoy less liberty than a prisoner in his cell. It is not uncommon for a liver produced by this course of feeding to be five times its natural size.

These livers are then baked and put through a screening or pulverizing process and packed in quaint cream-colored tureens of earthenware ready for individual service to the American consumer. Naturally they are expensive, a small one costing probably about two dollars at an American hotel or restaurant. Some whole goose livers are imported in tin cans. These are used by hotels and are garnished and flavored in many different ways.

America is now beginning to meet the demand for this delicacy, one large poultry farm in New England being a pioneer in this line. On this farm the goose livers are parboiled, baked, forced through

a fine screen or grater, and then packed in large crocks. Its trade is chiefly with hotels and delicatessens.

We also secure from France canned tunny fish; saucisson de foie gras, or sausage of goose liver, which is made of liver cut into small pieces, pistachio nuts, and pieces of truffle, thoroughly cooked and put up in cans; goose breasts and wings smoked, and the skin of the roasted goose. This latter product comes from Germany also. France supplies us with preserved rose leaves, and Germany with preserved rosebuds.

China contributes noodle soup and birds'-nest soup. This birds'-nest soup is a famous oriental dish made from the jelly-like substance found in the inside of the nests of certain kinds of swifts, or swallows. These nests are built upon the face of cliffs and it is extremely dangerous work to collect them. How far the prosperous Oriental in America

Swallow nests built on the face of a tall rock. These nests yield the substance from which birds'-nest soup is made

is willing to go to satisfy his taste for a rare delicacy in the form of soup is shown by the fact that this

tidbit costs from seven to thirty dollars a pound at wholesale, a really good grade costing fifteen dollars. This is generally used in combination with chicken breasts and a fine quality of ham. The "yen wai," or edible birds'-nests, as prepared for export looks much like cakes of fluffy white wax. The nests are found in many of the islands of the Indian and Pacific oceans.

Bottles of mixed fish come from Italy and contain tunny fish, olives, olive oil, pickles, spices, peppers, sardines, onions, and capers.

We also import many kinds of after-dinner candies from Old World countries. Vienna probably sends us as great a quantity as any other foreign city. Foremost among these candies are those with true fruit hearts, which are in great demand.

Home foods. Besides the imported delicacies named there are many kinds of American dainties to be had, such as cheeses, bottled fish, and canned fish, of which you have already been told. Many kinds of excellent American sausages and meats are displayed. Among these are cooked foods, such as fresh roast beef, roast pork, boiled ham, and veal loaf.

The delicatessen a friend in need. Almost all large department and grocery stores now have their delicatessen departments. While the original idea of the delicatessen was that it should be a shop of delicacies, it has now become a convenience store, a place where the busy housewife may buy a cooked or "ready-to-eat" meal.

In the large cities, the little delicatessen shop "around the corner" is a great help to the tired flat dwellers and all who wish to reduce housekeeping cares to the lowest possible point. It has many a

time saved the day for the hostess who has found herself face to face with unexpected guests. It does away with the necessity for carrying a supply of delicacies and cooked food in the refrigerator or icebox. A telephone call will bring a steaming dinner or cold lunch to one's door in short order if a thoroughly modern delicatessen is at hand.

An up-to-date delicatessen will generally have on hand, for hurry-up calls, steaming pots of soups and vegetables, with hot roast beef, pork, or mutton. Even hot tea, coffee, and cocoa may be ordered there. Cold dishes and salads are their staples. Cold baked macaroni, cold beef, cold pork, cold mutton, veal loaf, cold boiled ham, potato salad, deviled eggs, cold roast chicken, baked pork and beans, numberless salads—both vegetable and fruit—cakes, cookies, pies, sauces, puddings, brown bread, white bread, whole wheat bread, bran bread, graham bread, corn bread, are all ready for instant delivery. Besides all these there are shelves upon shelves of canned soups, vegetables, fish, meats, and fruits, ready to eat at a minute's notice. Ice creams, cold drinks, and ices are the delicatessen's specialties.

Specializing in foods. Some delicatessens specialize in the tempting foods of certain countries. One of these stores in Chicago claims to be able to furnish the German anything he has ever eaten in his old home across the water. Another delicatessen specializes in French foods, and its supply and methods of handling the food would surprise you. It has a little café in a side room where one may secure a dinner entirely of French foods, cooked by a French chef and served by French waiters. Almost

every large city has its Chinese delicatessen with a chop suey restaurant and curio shop combined.

In fact, it would scarcely be too much to say that if you were to explore any big city you would find there a delicatessen shop, the stock of which represents the special taste of some one foreign nation. All the delicatessens together would form an exhibition of the foods or delicacies favored by every foreign nation represented in the population of that city.

This does not mean that each delicatessen store is devoted exclusively to the foods of any one nation, —this occurs in only comparatively rare cases,— but that the average delicatessen tries to keep on its shelves a fairly representative stock of delicacies from every civilized country.

Chapter XXXI

WHAT THE WHOLESALER DOES

The wholesaler and his co-workers. The wholesale grocery house is about the most fascinating place to which you could possibly pay a visit. As we explore its wonders we cannot help saying to ourselves, "If every man, woman, and child who has helped to grow, to harvest, to prepare, to pack, and to carry the foods under this roof were suddenly to appear before us, we should look upon a strange and interesting sight, for we should see a great throng of people belonging to almost every race on the face of the earth."

Yes, nearly every country, nation, and tribe would be represented in that strange crowd. Even the inhabitants of the far-off islands of the sea would have a place in that queer gathering. Suppose we should see that amazing throng of workers from the four corners of the earth in one great procession passing slowly before our eyes. How much more vivid would be our understanding of the wholesaler's task of providing our tables with the wonderful variety of delicious foods common to-day in most American homes. Beyond doubt that strange company of toilers would lead us to wonder how it is possible for us to buy our foods at so small a price—foods far greater in variety, finer in quality, cleaner, and more wholesome than kings could command only a century ago.

The wholesale grocery a manufacturing plant. There is a common notion that the grocery jobber

or wholesaler is a middleman in the strictest sense of the term, that he receives a general assortment of

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Among the wholesaler's co-workers, who help harvest the foods later assembled under his roof, no race is more interesting than the young Tamil tea pickers of the Ceylon plantations

food products at one door of his plant and sends them out at another in practically the same condition in which they came in, and that for the mere matter of passing the goods through his hands he exacts a fat toll from the public. The merest glimpse of what goes on inside a great wholesale grocery is sufficient to destroy this idea and show

its utter absurdity. As a matter of fact, in its every-day practice, a representative wholesale grocery is a manufacturing plant. The extent to which foods are worked over into new forms more acceptable to the consumer is not known or even thought of by the average person. Nor does the average retail grocer have any adequate idea of the amount of hard physical labor put into the cleaning, changing of forms, and mixing of foods into combinations to suit the varied tastes of the public and to meet the requirements of the national and state laws regulating the purity, cleanliness, and labeling of all food products.

The reason why the real work of the wholesaler is so little understood or appreciated is plain when it is remembered that the general public seldom sees the inside of a big food jobbing house. Even the retail grocer, who is the connecting link between the wholesaler and the consumer, is almost a stranger to the real work of the wholesaler. And the reason for the retailer's lack of knowledge is that, as a rule, he comes in contact only with the selling end of the wholesale establishment and does not see what is going on "behind the scenes."

The big wholesale grocery is really the very center of one of the most vital activities in the study of world-geography — the gathering of foods from all the countries of the globe and the distributing of them, in much improved forms, to the people of a state or a group of states. As a situation from which to study practical geography there is probably no other place in the world quite so well adapted as is a wholesale grocery. By practical geography, we mean the kind that throws a searchlight upon the real and

important transactions in the world's trade, thus giving us an illuminated, world-wide view of the great currents and tides of international traffic in the things most necessary to man's life, health, and comfort—FOODS!

Changing food forms. Because the plain, hard, physical labor performed by the wholesale grocery

Grinding coffee. This is one of the lighter processes of changing food forms carried on in the city plant of a wholesale grocery house

house in the way of cleaning and refining foods is so important, let us confine our attention at the outset to the work the wholesaler puts upon them as they pass through his hands. Later we shall look at the other form of labor which the jobber is called upon to include in the service he gives for the toll he takes. For the present, let us take a trip through the wholesale grocery with eyes alert for only one thing: the changes which foods in the wholesale

plant undergo to make them more attractive and convenient for distribution.

In the first place, the larger wholesale grocery houses, particularly those located in the business centers of big cities, are obliged, for the sake of economy, to maintain two separate plants. In both plants a certain amount of work is done in cleaning, refining, and otherwise changing foods.

The plant in the center of the city is devoted mainly to distributing rather than to manufacturing. Here only the lighter processes of cleaning and changing of food forms are carried on. By far the larger part of this kind of work, especially its heavier and less interesting processes, are carried on at the other plant, commonly called the factory. Usually this plant stands either on the outskirts of the city or in some small suburban town having extensive shipping facilities and a sufficient supply of the right sort of labor. But if the wholesale house is not located in a large city, you are almost certain to find the distributing and the manufacturing activities of the establishment carried on under one roof. This is sometimes true of grocery jobbing houses situated even in the large cities, although the tendency is to separate these two branches of work in the manner indicated.

The wholesaler's work varies with the seasons. When you come to think about it, you will realize that it is clearly impossible for you to get more than a mere suggestion of the variety and scope of the work which the wholesale grocery puts upon foods, unless you go through the plant as often, perhaps, as once a month. The reason for this is that foods are seasonal to a peculiar degree — a fact which is

continually being reflected in the change of work going on in the wholesale house from week to week.

Courtesy of U. S Dept. Agr.

Sorting a big shipment of figs in a Smyrna packing house. On arriving at the wholesaler's these figs must be cleaned and repacked before they are put on the market

Almost every food brought from a foreign country arrives at about the same time each year. If you were to walk through the plant, for instance, just after the big shipments of figs had arrived from Smyrna, you might be inclined to think that a large share of the wholesaler's work was the cleaning and repacking of figs. But if you made your visit a month later, you would probably not see any figs at all in the packing room. Therefore, you may be sure that no matter how often you may make a geographic pilgrimage to the wholesale grocery house, you will find some new work in progress in the packing rooms which was missing from the scene when you were there before.

A glimpse inside a wholesale house. Here is a glimpse of the actual work being done in one of the largest wholesale grocery houses in the Middle

West—a house having an auxiliary plant in a large manufacturing town near by where all the heavier

In the laboratory of a wholesale house in the Middle West. The chemist plays an important part in preserving foods and changing food forms in a great grocery house

work is done. The wholesale house proper is not far from the central part of the city and is the headquarters of the selling, accounting, distributing, and administrative branches of the big enterprise.

Preparing prunes for the grocer. A large part of the top floor of this marvelously equipped wholesale house is given over to the work of cleaning, sorting, and packing prunes, figs, currants, and almost every other kind of dried fruit. Here we see men handling great cakes or cheeses of prunes, opening the original packages, breaking up the big solid masses, and putting them into a hopper from which they are automatically fed into a vat of boiling water. After remaining there for an instant they are lifted on a revolving screen and dropped into

another vat. This process is repeated six times. As the prunes come out of their sixth and last steaming bath they are not only well cleaned but are also immensely improved in appearance. This extreme care and thoroughness illustrates the progressive tendency of modern food manufacturers who are apparently alive to the value of making their products not only scrupulously clean but attractive as well. The processing to which the prune is subjected certainly gives it an appearance which makes an unfailing appeal to the eye of the consumer.

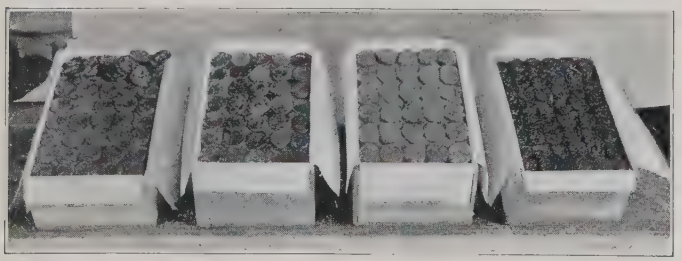
The remarkable machine in which many kinds of whole dried fruits are washed is capable of cleaning 30,000 pounds of prunes a day.

After their last bath, the prunes are automatically

In the packing room of a wholesale house. Packing high-grade prunes for the retail grocer's display

emptied upon a moving screen which acts as a conveyor and at the same time dries them by shaking

from them the last lingering drops of water. The conveyor dumps its burden into a clean bin where



Fruits packed for the retail grocer. These boxes of dried fruit have been "faced" to give them an attractive appearance when displayed

the fruit is shoveled into boxes which follow each other in quick succession on the platform of a pair of scales. Prunes above the ordinary grade are generally packed by girls, who put them into the boxes in orderly tiers so that they may make a pleasing and attractive appearance for display when the box is opened in the retail grocery. Sometimes only a few layers at the top of the box are arranged in this way, all the prunes underneath being put in loosely. This is called "facing."

Currants from Greece. On this same floor are other machines, constructed along similar lines, which are especially designed for the cleaning of immense shipments of currants from Greece. A man about to break open one of the original packages pointed to the word "Cleaned" branded upon the side of the package. He laughingly explained that this was stamped on the package by the American Consul or his deputy. While the currants were undoubtedly cleaner than those sent to other countries, they certainly did not come up to our present American standards of cleanliness in the matter of

foods. We learn that this particular shipment of currants being cleaned came from Patras, Greece.

Cleaning and seeding raisins. Raisins receive a little different treatment, being given what may be called a Turkish bath. First they are placed in a room almost as hot as an oven and allowed to remain there until dry, at least on the surface. Next they are placed upon sieves in an automatic machine where they receive a violent and thorough shaking which frees them from dust, dirt, and sand. Then they are given a hot bath, after which those to be sold as seeded raisins are sent to the seeder. This machine, though small compared with that used in the raisin factory, will seed 300 pounds an hour. This machine is only one among many other ingenious devices that make up the equipment to be found in the modern wholesale grocery.

Foods cleaned by hand. As we pass along in this large room we notice several girls standing, or sitting on stools, at a row of sinks. These girls handle the various nuts and dried fruits which can be cleaned to better advantage by hand. At present they are cleaning a consignment of large almond meats from Valencia, Spain. One of the workers tells us that the house also obtains almonds from Italy and California.

A favorite from the tropics. Of all the dried or cured fruits that are brought to us from foreign countries probably none is in more urgent need of a good hot bath and similar attentions than dates. Dates begin their long journey in a torrid country on camel-back, continue it on a freight train, and are then perhaps stacked on the deck of a tramp schooner with the fierce sun beating down upon them. Next they are transferred to a regular ocean liner

and finally reach the wholesale house with the sticky, sugary sirup oozing from every crack and crevice of the original package. This oozing begins in the oasis where the dates are grown. It continues throughout the trip across the desert, on wharves and docks, on the decks and in the holds of the vessels, in freight cars, and at every step of the long pilgrimage. By the time the package reaches its destination it is literally encrusted with a thick covering of combined sirup and dirt of about the consistency of tar.

While the dates inside the package are considerably protected, still the dust and dirt penetrate to them. This is true only of bulk dates, and not of those packed in small and tightly sealed boxes before they leave Arabia.

The process of cleaning dates is not essentially different from that of washing prunes, except that hot steam as well as hot water is used.

As we pause at the elbow of a girl who is seeding and stuffing dates, and note the skill that is required to get the seed out without taking any of the meat along with it, we are greatly impressed by the painstaking care with which this delicious food is prepared for our consumption.

Making a reputation in the coffee trade. The coffee room is one of the most important places in any wholesale grocery house; this is not only because coffee constitutes an important commodity in the wholesale and retail food trade but also because the average consumer of coffee is probably more particular about it than about any other article in his whole range of foods and drinks. Another consideration which emphasizes the importance of the coffee room

Courtesy of U. S. Dept. Agr.

Preparing dates harvested in an oasis in the Sahara for the camel train, the first step in their long journey to America

is the fact that high quality in coffee, as the consumer sips it from his cup, is far more a matter of successful blending and roasting than it is of choosing just the right raw material, or natural berry. But it must not be understood that there is not a decided difference in the characteristics of the coffee beans or berries from the various coffee-growing localities.

Any master of the art of blending and roasting can take a coffee which in itself would not make a pleasant drink and, by his clever and skillful blending with other varieties, produce the basis of a brew that will win high praise from the most exacting coffee drinker. This is admitted by coffee experts generally and it is therefore easy to realize that the work done in the coffee room must be of the most expert and dependable character if the house is to make a notable reputation on its coffees; and this is usually what it tries to do if it is wide awake and progressive.

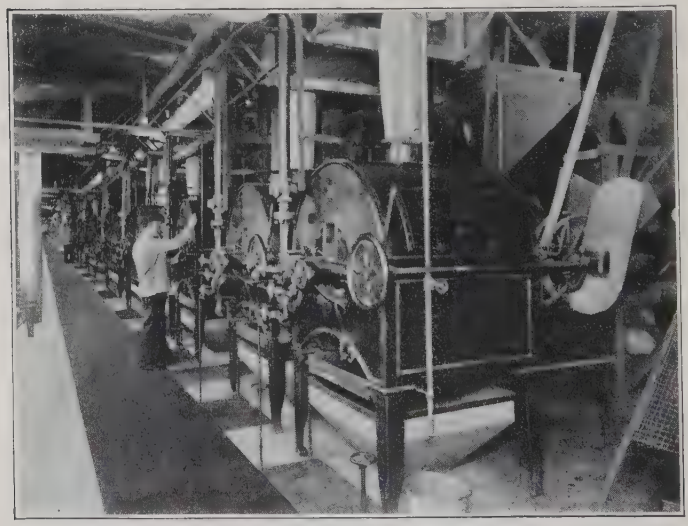
Preparing coffee for the trade. The first thing done in the process of cleaning the raw bulk coffee berries is to send them through the separator. This machine operates on about the same principle as an old-fashioned fanning mill, or small grain separator. It consists of several rapidly shaking screens, and as the coffee passes over these the sand and dirt fall through the mesh while the chaff and dust are carried away by air suction.

The coffee is dropped from the separators into the bins from which it is drawn for blending. After it has been blended, the coffee is elevated to the roasters where it is roasted for from fifteen to twenty minutes. The more modern roasters are so arranged that a small stream of coffee is constantly trickling through an opening from which the expert

in charge of the roasting may at any moment draw a sample. This he does frequently.

From the roasters the coffee is dropped into a bin or bins below. It is on its journey from the bin to the compartments tapped by the sacking chutes that the coffee is freed from small stones and other particles too large to pass through the mesh of the separator's screens and too heavy to be carried off by air suction.

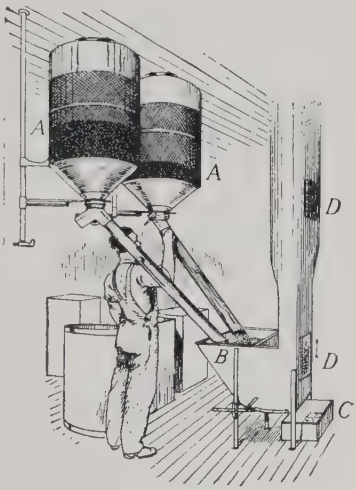
This bin is really a big hopper (*A*-*A*), from the bottom of which a large pipe or conduit leads off at a downward slant, ending in a smaller bin (*B*). The pitch of this pipe is just sufficient to keep a stream of coffee moving steadily along. From the



Coffee roasters in a great wholesale grocery

top of the smaller bin, into which the slanting conduit—along which the coffee is carried by the force

of its own weight—empties, is a pipe (*D-D*) which leads to the big storage bins above. Through this pipe moves an upward suction of air, whose strength is so regulated that it is just sufficient to pull up the coffee beans, which have been lightened by roasting. At the same time, this air current allows the small stones and other heavier particles to slide along the remainder of the slanting chute and drop into a still smaller bin (*C*).



How coffee is carried to storage compartments by air suction

If the coffee is to be ground and sent out to the trade in sealed cans or airtight packages, the hopper containing the blend will feed direct to the grinding machine. A coffee-grinding machine of large capacity is capable of turning out 1,000 pounds of ground or steel-cut coffee a day. It is well to remember, however, that only about 10 per cent of the coffee sold is ground in the wholesale house. This is because ground coffee loses strength unless it is in airtight packages, and consumers usually wish to have the coffee berries remain whole as long as possible. By far the greater part of the coffee used is ground by the retail grocer for each individual customer.

Unground roasted coffees are commonly sent out

to the trade in drums that resemble in appearance small barrels or casks. These are also tightly sealed.

In the packing room of a wholesale house. Here ground coffee for the retail trade is being put up in airtight containers

Many retailers carry a small stock of unroasted coffees, which are sent to them in sacks, as it is not considered necessary to keep unroasted coffees in airtight packages.

Spices. Now for a glance into the room where the wholesaler prepares his output of spices. Unless you have been in such a room, you may quite naturally imagine that the fragrance of the spices would be decidedly pleasant, but that is not true. When the spices are being ground they give out an aroma altogether too strong and pungent to be agreeable. It is even quite disagreeable to stay for any great length of time in the room where cinnamon is being ground, and this is the least offensive among all the spices. Usually each spice grinder is able to

turn out from 500 to 600 pounds of ground cinnamon, cloves, or pepper a day.

"That is what we call broken cassia cinnamon," explained the man in charge of the spice-grinding machines. "It is the kind that is almost invariably ground. Of course we also carry the fine Batavia cinnamon which is sold to the retailer unground or in what we call 'sticks.'"

It is interesting to study the native materials used as wrappings for original packages from remote places, like the Moluccas (Spice Islands) and other islands of the South Seas, where most of the spices are grown. Cinnamon, for example, comes in packages containing about 100 pounds. The outer wrapping is

Brown Bros.

In the workshop of a South Sea island plantation. Here the native islanders sort and prepare stick cinnamon to be packed for shipment to the world's markets

of rushes or bamboo. Each kind of spice usually has its own particular style of package and wrappings.

In spite of the fact that automatic scales are used to weigh the spices for the little packages or boxes in which they are to be sealed, the amount of work involved in putting the spices into their final containers is by no means small.

Pulverized sugar. The grinder that turns out pulverized sugar is a curious type of mill. Instead of having stones, burrs, or rollers to reduce the granulated sugar to the finer pulverized form, this clever device is so constructed that it forces the sugar crystals themselves to do the work of grinding by their friction against each other. An interesting feature of the pulverized sugar room is the nervous battery of bolters by which this finely powdered sugar is screened. The bolters are huge sifters covered with bolting cloth of varying degrees of fineness, through whose meshes the powdered sugar passes.

Baking powder. The baking-powder mixer is simply a long cylinder inside of which revolves a corkscrew mixer or "agitator," which stirs and blends the ingredients of baking powder with systematic thoroughness.

Tastes in tea. We cannot explore a large wholesale grocery house for the particular purpose of learning just how much work the wholesaler puts on the foods he gathers from far and near before he passes them on to the retailer, and fail to visit the room in which teas are blended. While it is true that certain blends of tea are commonly used throughout the whole country, on the other hand it is hardly too much to say that many communities have developed individual tastes in tea. Perhaps one town will demand a special blend, which no

other place in the territory of that wholesaler requires. Very many times this is due to the

An important work. Labeling special blends of tea that have been put up in convenient packages for the retail trade

nationality of the inhabitants of the community. For example, a retailer in a locality largely settled by Russians would naturally carry a heavy black tea of a blend to be drunk with only a slice of lemon in it. On the other hand, a retail storekeeper in a typical New England town would be very sure to sell much more green tea than black. Again, this local taste is undoubtedly often fixed by what may be called social accident. For instance, some society leader in the town has a decided preference for a special blend of tea and is not backward about talking of its merits. Those of her friends who are inclined to follow her lead will scarcely fail to ask their own grocers for the brand of tea she serves.

But no matter how each community may have arrived at its preference for a certain kind of tea, the fact remains that the tea blender in the wholesale house must be able to keep close tab upon these various local preferences and so mix his materials as to satisfy each particular taste. In order to do this with the highest degree of success, he consults as frequently as possible with the traveling salesmen of the house and carefully considers with them the tea taste of each town in their territory. This information is all systematically recorded.

The tea blender in the big wholesale house is essentially an artist in catering to individual and community tastes in an article about which people are uncommonly exacting and sensitive. Therefore, his task is not an easy one. But it should not be inferred that every community demands an individual blend of tea not known and marketable in other towns; it is true, however, that many communities do demand an individual blend.

Extending the olive market. Now let us take a look into the olive room, which is quite likely to be in the basement of the wholesale house unless the packing is done at the "factory." Indeed, you will probably find that nearly every wholesale grocery which maintains a separate factory handles olives there and in its main establishment also. Practically all our green olives come from Spain. The Spaniards put them up in huge hogshead-like casks called "pipes," containing from 160 to 180 gallons of olives and brine. Only a very few retailers are able to handle olives put up in these big original packages. Consequently the wholesale grocers have the task of opening up the casks, grading and

washing the olives, and repacking them in smaller and more convenient and attractive containers.

In the basement of a wholesale grocery house. These huge "pipes" or hogsheads contain olives from Spain waiting to be graded, washed, and bottled

The grading and packing are done because the American consumer buys, in the matter of olives at least, on the score of appearance. If he feels he can afford the best he insists upon having a bottle of big, fat, selected olives for which the merchant is obliged to charge him a corresponding price.

The consumer who must be careful in his expenditures goes to the other extreme and buys the smallest olives. If there is any actual difference in quality or taste between these two extremes it is usually too slight to be noticeable. By this process of grading and repacking bulk olives, the varied tastes and demands of consumers may be met at prices

they can afford to pay. At the same time the jobber extends his own olive market and that of the

Packing olives in a wholesale plant. Stuffing and packing olives in the attractive forms offered by the retailer are laborious processes and require deft and well-trained fingers

retailer beyond the limit that would be possible if the ungraded bulk olives were put upon the market just as they are received.

The stuffed olive is highly suggestive of the alertness with which the wholesale food merchant watches for an opportunity to put more work instead of less upon the materials that come to his hands, in order that they may make a still wider appeal to public taste. Not many years ago the stuffed olive was unknown; to-day almost every retail grocer in a town of any considerable size carries this delicacy as a staple.

The wholesale grocer, looking for something new to make a fresh appeal to the fastidious consumer,

tried a combination of the green olive and the sweet red pepper called pimiento, both imported from Spain. The result was so satisfactory that the idea proved to be little short of an inspiration. The work of removing the stones from the olives and inserting the little rolls of pimiento flesh is usually done by girls, as is also the packing of olives in bottles. Both are laborious processes and require deft and highly trained fingers to do them well and swiftly. As far as possible, the girls handle the olives either with little tongs or with forks, refraining from touching them with the fingers except when it is absolutely necessary. If in packing the olives any have been touched with the fingers, they are again washed before the final brine is poured in and the bottle sealed. This seems to be the rule in the olive rooms of all houses where olives are packed.

Work in the factories. Where a wholesale food house maintains a separate factory, the work done there is more strictly manufacturing. In these factories, making jellies, jams, and preserves, putting up pickles, sauces, relishes, salad and meat dressings, and preparing nut butters of all kinds are only a few of the activities that the visitor may see at almost any time.

Along one side of the factory you may see a long line of steam-jacketed kettles and caldrons standing on a concrete platform, each kettle being so equipped that it may be mechanically tilted with the greatest ease by means of a lever. These huge kettles are of varying sizes and are employed in cooking almost every kind of food product manufactured in the plant. At one time you may find practically all the large kettles devoted to cooking

ketchup, while at another time they may be filled with beans. The factory is probably never more

Where preserves, jellies, and jams are made. Transforming peaches into preserves in the great kettles or caldrons at the manufacturing plant of a wholesale food house

savory than when some of the kettles are devoted to making confections composed mainly of maple sugar or maple sirup.

A word to the wise. Please remember that in this hurried trip through the wholesale house—with just a peep through the door of the special factory where canning and preserving and pickling are the main lines of activity—you have followed only one single line of observation. That is, you have seen only what the wholesaler does to the foods which he sells to the retail grocer and the work required to make them more acceptable to the consumer from the standpoint of attractiveness, of convenience, of cleanliness, and of wholesomeness.

Do not imagine for a moment that all of the work bestowed upon foods and food materials in the wholesale house has been even hinted at in these pages. The pains the jobber takes to make foods more acceptable to the public could not be completely described in several times the amount of space occupied by this chapter. The information given here is intended rather to stimulate you and your geography teacher to make a visit to a large wholesale house on your own account and to discover its interesting activities with your own eyes, rather than to rest content with the few facts the chapter presents.

Chapter XXXII

WHAT THE RETAILER DOES

The grocer's place in the town's business. Did you ever ask yourself what is the most important business carried on in your community?

This is really about as vital a question as you could raise, because the answer forces you to learn the truth about a situation that has become obscured by false notions and traditions. Perhaps the easiest and surest way to get at the right answer to this question is to imagine yourself in a community wholly cut off from all the rest of the world, at least for the time being, and then ask: "In such stress, what business could we least afford to spare?"

Only a little thought will be required to convince you that the grocer, or food merchant, would be the one man to whom all eyes would turn in such an emergency. Men and women can wait a long time, if obliged to, for most of the things they buy which are commonly called necessities, but they can wait only a little while for food. They must eat or they will perish!

Most of us are in the habit of thinking that the banker, for example, is an important man. So he is. But there are many small towns that get along very well without a bank, using little actual money. Put to the same test every other business and you will soon see that selling foods is the only business absolutely necessary to the community all the time. It cannot be spared, even for a short time, without serious harm.

Possibly you will say that clothes are quite as necessary as food. The answer is that you could wait much longer for a new stock of clothes than for a new supply of food.

The grocer's services varied. The notion is quite common that about all a retail grocer does is to deliver goods over his counter and take money in return for them. It is true that all his activities center around supplying the people of his locality with foods and that his motive for doing this is to make money. On the other hand, he does so much more than merely hand out goods and take in money that it would be a great injustice to him to look at his work in this way and fail to see the real importance of his service to the community.

The position of the wholesale grocer who distributes food supplies to the people of his territory may be compared to that of a big bank which supplies money, through many smaller banks, to the people of the district in which it operates. The retail grocer is the link in the chain which connects the food producer with the consumer. We may aptly call him the country banker of foodstuffs.

The grocer as a banker. But the retail grocer is far more than a banker in food supplies. In many instances he is also a money banker for his customers because he gives them credit; or, as the common phrase has it, he "carries them" on his financial shoulders. The length of time for which the grocer carries his customers depends largely upon local conditions, upon whether he is located in a city or a country town, and whether the customers get their money from mills and factories or from farms and ranches. The storekeeper in a manufacturing

town, where the men are paid by the week or month, does not usually give his customers credit for longer than thirty days. But, of course, in times of slack work or in hard times, he is often obliged to stretch his credit over several months.

In the country districts, where the storekeeper's customers are mainly farmers, dependent upon their crops, the credits frequently run from harvest to harvest. In dairy districts where farmers get regular monthly milk checks, as in manufacturing towns, thirty-day credits are the general rule. Often this really means that the grocer or retailer actually furnishes a large part of the money on which his community does business. In thousands of cases, grocers are actually paying interest on the money their customers owe them. Suppose, for example, that a storekeeper started in business, as many do, with almost all his capital invested in fixtures and equipment. This would mean, of course, that he would have to buy his stock on credit. Then, if he had to carry his farmer customers from one crop to another, he would soon be forced to borrow money to meet his bills at the wholesale house and thus keep his credit good at the source of supply. In case of a crop failure it is often necessary for the storekeeper to shoulder a double burden of credit and wait until still another harvest for his money. Sometimes this means a year and a half or even two years that the storekeeper must stand behind his unfortunate customers, furnishing them food until they succeed in raising a crop and marketing it.

Banking, or financing his customers, is not unusual on the part of the storekeeper but an ordinary happening of trade. The storekeeper does not

intend to do a banking business when he starts out, but circumstances draw him into it. He must do it for his own protection, to hold his trade together, until his customers succeed and pay their bills.

Of course there are thousands of farmers and ranchmen who can and do pay their bills at the end of each month, as there are thousands of doctors, lawyers, laborers, and business men who settle their store accounts every thirty days; but almost every storekeeper must act as banker to a large part of his trade. If his customers all paid promptly, the storekeeper would not need to borrow money to carry them along, and would not only save the interest on this money but would be able to pay his own bills promptly enough to save the discount allowed for cash or prompt payment.

It is quite natural to ask why the retail storekeeper does not require his customers to pay interest on their overdue accounts, thus offsetting the interest he must pay on money borrowed to carry them along. In many cases this is done, but it is not easy to carry out this plan in all instances, because the average storekeeper hesitates to ask a customer to pay interest. And the customer who, under ordinary circumstances, is good pay resents such a request from a storekeeper to whom he gives a substantial trade from month to month.

The grocer as a warehouseman. The retail food merchant gives his community still another kind of service which is seldom recognized or appreciated by his customers. He acts as warehouseman, carrying reserve foodstuffs in a way that keeps them in good condition, ready to be dealt out in small quantities as they are needed by the consumers.

He does more than this—he takes the risk of loss by breakage, by shrinkage, by waste in handling, and

Where the grocer acts as a warehouseman. Reserve foodstuffs in a great retail grocery ready to be sent out to customers at a moment's notice

by the general decay to which many food products are subject. Again, he is liable to loss by decrease in the market value of the goods themselves. This is the penalty he pays for being a food banker.

Suppose your mother, like her mother or her grandmother, perhaps, was obliged to buy her stock of groceries and prepared meats for practically a whole year in advance, and not only buy them but store them in the house. Before that year's stock of foodstuffs was used, would not your mother be more than willing to give up all the profit of the retail grocer on those goods if she could only be saved the loss and waste of every kind and the bother of caring

for them? There is little doubt that the retailer's profit on those goods would seem a small reward for all that she had been obliged to endure to secure the benefits of buying in quantity. A household experiment of this kind would show clearly just how much service the retail storekeeper gives to his customers by acting as a warehouseman and delivering food supplies in small quantities and in fresh condition.

Those who are inclined to believe that the retailer takes a heavy toll for his services should bear in mind that the retail grocer's rent or cost of providing a place in which to do business, his payroll for help, his taxes, his insurance, and even the money he must pay out in order to give his customers the long credit they demand by no means make up the total sum of his expenses. He is called upon to contribute to every cause in the community for which popular support is sought — church enterprises, the Fourth of July and other town celebrations, the village band, the high-school baseball and football teams, and all forms of charity.

How the city retailer serves the public. Suppose we visit a high-class retail store and see just what the retailer is doing for his money. This is a fancy grocery in a large city—an aristocrat among retail stores. An obliging clerk will personally conduct us through the store.

Notice close to the door those crates of French endive. You will see by the label on the box that they were imported from Belgium. Those alligator pears or avocados were brought from the West Indies. Over there on that long porcelain counter are piles of cucumbers, crisp heads of lettuce,

Brussels sprouts, and many other varieties of garden products, all of the choicest. This is no special

Brown Bros.

In the market of a modern grocery. The vegetables to be found in a high-grade market of this type are choice products received daily from every part of our country

display prepared for an unusual occasion, but merely the ordinary stock handled each day in this store.

You ask where such wonderful vegetables were obtained.

"Throughout the country," replies the clerk. "We have a number of experts in garden truck who visit our gardeners and select the choicest of their stock. About twenty-five gardeners are raising vegetables especially for us and the best of their product is shipped here. In order that we may not be handicapped by unfavorable conditions in any one locality, we are in touch with gardeners in every section of the country, and have buying stations in

Florida, in Michigan, in California, in Texas, in New York, and all through the Middle West. Our

A display of ready-to-eat foods. The pastries and other foods seen on these shelves and in these cases have been specially prepared for this high-class grocery

growers raise the vegetables according to our instructions. We furnish the seed and give explicit directions as to how each product is to be grown. This also applies to much of our fruit. We have a man raising peaches for us who is said to produce as fine a peach as any grown in America. In several states we have melon farmers who send us their finest fruit.

"Our store has a woman cook who makes fancy pastry especially for us. Even our crackers are of a special quality. The woman receives fancy prices

for her pastry, and the cracker company charges a little more for the special crackers. We pay from 20 to 100 per cent extra for the special foods prepared for us and also a large sum above the regular market price for everything that is accepted from the gardens, orchards, and fields of our special growers. Even the printer gets a bonus for putting extra care into the printing of our bags, labels, and boxes."

The small-town grocery. Now let us go into a typical small-town grocery store and market and see the foods handled there every day.

First of all, we see several boxes of oranges and a box of lemons. At home we usually order a dozen oranges and perhaps a half dozen lemons, as we need them. The grocer tells us that the wholesaler expects to sell at least a box of lemons at a time and more than one box of oranges. He also says that the shipper would not think of handling less than a carload of either of these fruits, while the grower expects to sell his entire crop to one buyer. Since few families would care to purchase several hundred lemons or a box or two of oranges at one time, we see plainly that the retailer is necessary in the handling of such fruits.

There hangs a bunch of bananas. The retailer cannot buy fewer than a bunch at a time, the wholesaler must buy them by the carload, and the importer by the shipload. Few private families could afford or would wish to buy bananas by the bunch. So again we see how real economy is impossible without the local retailer.

Notice the grocer's supply of nuts—walnuts, peanuts, pecans, almonds, and Brazil nuts. It would

not be difficult to store a considerable quantity of nuts in one's home, but on account of their bulk it would hardly be advisable. A hundredweight of nuts is a very small order for the grocer to give a wholesaler, but a hundred pounds of nuts would be both an expensive and cumbersome item for the family larder.

We see on the counter a generous supply of vegetables—all brought in from the outlying truck farms early this morning. The grocer sent his delivery boy for them in an automobile. The boy called at several farms and truck gardens before he found just what he wanted. His speedometer showed that he traveled eighteen miles on that trip. Suppose before we could have string beans, fresh tomatoes, potatoes, and peas, we had to get up early in the morning and travel eighteen miles for them. Surely the retail grocer is a convenience, at least.

On the next counter are a number of cantaloupes and osage melons from Michigan. They are especially early ones, too, obtained from the city produce merchant at a fancy price. Our retailer had to buy a crate holding twenty-five of them. One family could not afford to take more than three or four of such melons.

Balancing supply and demand. But, perhaps you think that if we were willing to wait a little, we could buy all these things much more cheaply in their natural season direct from the farmers who grow them. Perhaps we could, but it must be remembered that there are many parts of our country where such things cannot be raised. Again, an unfavorable season will cause a scarcity of them in a wide territory. In our home town, the farmers raise

good fruits and vegetables. But one year, for some reason, we had few tomatoes and very little corn,

An everyday scene in a high-class retail grocery. A glance at the fruit section of this grocery shows how the surplus products of many localities collected by the wholesaler are utilized by retailers throughout the country

and a blight seemed to have struck the cucumbers and melons. Yet a little later the grocers were selling these things at about the usual price and we really did not suffer from any scarcity of them. On the other hand, there were a hundred cabbages raised near here to every one that could be eaten. It looked as if cabbages could be had for nothing, for the truck farmers would have to throw them away. But retailers in other parts of our country would not permit that. The great majority of the cabbages raised in this vicinity were shipped away by wholesalers and bought by the retailers in other states

where cabbages were scarce. Other communities had a surplus of melons, cucumbers, and tomatoes. So, in effect, through the wholesaler and retailer, the extra cabbages were being traded for the surplus tomatoes, cucumbers, and melons produced by the growers in other localities.

Buying from the producer. Sometimes, especially when food prices are extremely high, consumers try to do without the retailer by buying as much as possible of their table supplies from the producer. Perhaps this has been successful in some cases, but on the whole these experiments seem to show that both the producer and the consumer can make profitable use of the retailer's services. Generally when the consumer attempts to buy directly from the producer, he finds it necessary to pay almost as much for the eggs, the potatoes, or the poultry straight from the farm as the local retailer demands. At the same time he fails to receive many desirable things which the local grocer must furnish in order to hold his trade. Among these things may be mentioned experienced grading, packing, and handling, also credit, and delivery in small quantities at the convenience of the consumer.

If there is one special line of food distribution in which the retailer is indispensable, it is that of selling meats and fish. Were it not for the retailer, the average family would be compelled to go without fresh meat entirely, and the people living inland would find it practically impossible to serve fish on their tables.

Buying in quantity. There are many purchases the housewife would find it wholly impossible to make if the retailer—and behind him the wholesaler

—was not on hand to solve the troublesome problem of quantity buying. Many families, for example,

In the cheese room of a wholesale grocery house. Cutting up big wheel-like cheeses into convenient size for the retail grocer

like Swiss cheese. But a whole cheese of this kind weighs about 200 pounds. Only the largest retail grocery houses have enough trade to dispose of a whole Swiss cheese within a reasonable time. Therefore, the wholesaler cuts one of these big wheel-like cheeses into quarters or eighths for his various retail customers. In turn, the retailer cuts this section of a wheel into smaller pieces in order to meet the immediate needs of his Swiss cheese customers. For example, he sells Mrs. Smith, who has a large and growing family, two pounds of cheese at a time, and Mrs. Jones, who has no hungry boys and girls to demand Emmenthaler cheese sandwiches, a quarter of a pound.

If Mrs. Jones could not buy so small a quantity of this cheese she would no doubt be obliged to go without it altogether. And while Mrs. Smith is able to use about eight times as much as Mrs. Jones, she, too, would find it necessary to deny herself this prized article of food if it were obtainable only in big sections, the size of the one bought by her retail grocer from the wholesaler. So the retailer—by providing for the combination of many small purchases —places within reach of his customers many kinds of food they otherwise could not have.

Even in so small an item as fowls the work of the retailer is important. Here is an example taken from personal experience. One day we bought a chicken from a dealer who made four cents on the transaction, but to earn that four cents he drove into the country for the chicken, paid cash for it, dressed it, and sold it on thirty days' credit. No doubt his margin of profit in this instance was a good deal below the average.

You have already learned that before a great many kinds of foods reach the consumer they must pass through many processes. Of course you also understand that it would be impossible for a family to buy its tea, coffee, spices, and similar foods direct from the producers, and that it would be equally impossible for the jobber or the wholesaler to sell direct to the consumer. The wholesaler must handle millions of pounds of food every year and to attempt to sell it in one-pound lots would be impractical and commercially impossible. Then, too, the instant the jobber began to sell direct to the consumer he himself would become a retailer, and would have to carry the retailer's expenses in one form or another and

charge the retailer's prices. At the same time, it would be impossible for him to give the retailer's service.

The grocer a local agent. When considering the service of the retailer, it is important to remember that he is really the local representative of the wholesaler, the manufacturer, the producer—and is right on the ground where he can be reached at first hand by every customer to give protection and satisfaction.

The grocer's profit and loss. It is common to consider the difference between the buying price and the selling price of the foods handled by the grocer, or his gross profit, as a tax on his customers for the service he renders them. After his expenses are deducted there will be a great difference between this so-called gross profit and his net or real profit—which represents his pay for his work, just as the street-car conductor's weekly wage is his pay. But the money or capital which the retailer has invested is really an assistant which demands its wage and gets it too. The retail food merchant must be repaid this outlay with a little extra for profit and for insurance against the risk that he takes. For the fact is, the retailer of foods of any kind is constantly losing money on account of various shrinkages.

For instance, it is not uncommon to see a half dozen crates of strawberries sold at less than one third their normal price because the grocer fears that unless he sells them at once they will "go bad" on his hands. Of course, he loses money on such sales, and he constantly faces such conditions.

Retailer and wholesaler partners. In a way, the retailer has the wholesaler back of him in the service

he gives to his customers. How far the retailer can rely upon the wholesaler depends partly upon his character and standing, partly upon how far the wholesaler can afford to back him, and partly upon the local conditions of the trade. Looked at in one way the wholesaler and the retailer are partners. When the retailer finds that he must shoulder an unexpectedly heavy burden in carrying his farm customers over a crop failure, it naturally follows that he must lean still more heavily on the shoulders of the wholesaler. The wholesaler usually makes a reasonable response to this demand for additional credit because the retailer's business pays a profit to the wholesaler. He is therefore vitally interested in seeing the retailer retain his standing, his trade, and his customers. On the other hand, the retailer must bear his own burdens to a considerable extent and keep his standing good with the wholesalers from whom he buys his goods. This means that if he has not capital enough of his own to meet his needs, he must borrow it. Often the retailer is forced to borrow heavily as well as to ask credit of the wholesaler in order to carry his own customers over a period of hard times.

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